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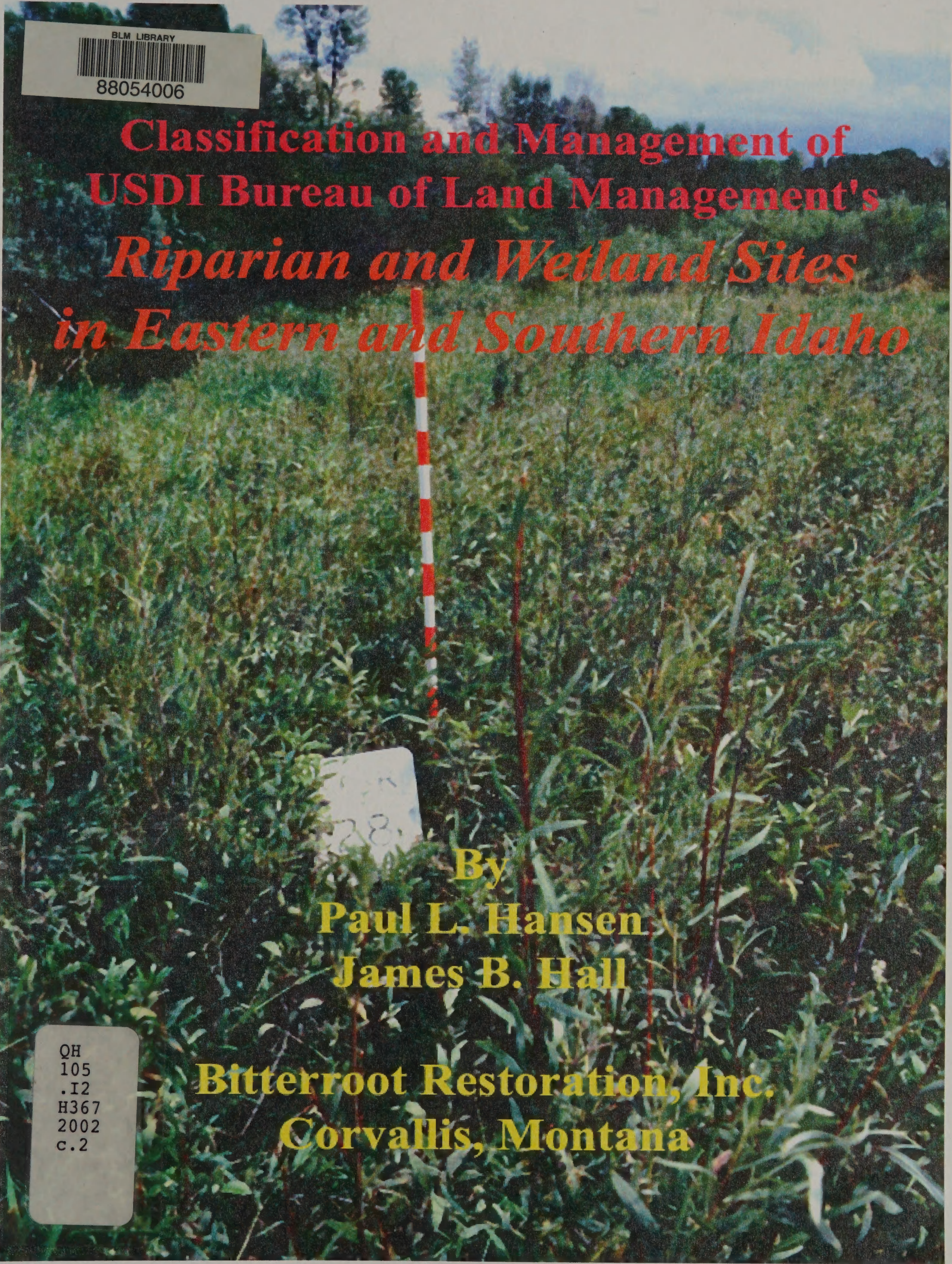

Classification and Management of USDI Bureau of Land Management's *Riparian and Wetland Sites in Eastern and Southern Idaho*

By
Paul L. Hansen
James B. Hall

Bitterroot Restoration, Inc.
Corvallis, Montana

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From the Desk of Ervin Cowley

January 14, 2003

Subject: *Classification and Management of USDI Bureau of Land Management's Riparian and Wetland Sites in Eastern and Southern Idaho*

Enclosed is a copy of the recently published *Classification and Management of USDI Bureau of Land Management's Riparian and Wetland Sites in Eastern and Southern Idaho*, by Paul L Hansen and James B. Hall.

If you have questions or would like additional copies, contact Ervin Cowley.

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INTRODUCTION

Riparian areas in the American West are typically thought of as the green zones bordering rivers, streams, seeps/springs, ponds and lakes—essentially those areas adjacent to ephemeral (intermittent) and perennial (permanent) flowing or standing bodies of water. Although not synonymous, the terms riparian and wetland are often used in combination to describe the complex environments, which occur at the ecotones between land and water. Shaw and Fredine (1971) refer to wetlands as bogs, marshes, sloughs, wet meadows, potholes, swamps, and river-overflow lands, although this list is not all-inclusive. These areas represent the transition zones between aquatic (deep water) and upland ecosystems, occupying an intermediate position between, and thus having some characteristics of both environments (Mitsch and Gosselink 1993).

In the semi-arid and arid regions of western North America, riparian and wetland areas constitute perhaps some of the most critical resources on the landscape. Riparian and wetland vegetation help to reduce bank erosion and trap sediment from side-slope run-off during precipitation events, reducing soil loss over time. Instream vegetation can reduce the velocity of floodwaters, which in turn may allow sediments and other pollutants to settle out of the water column, resulting in greater water quality. These zones may act as discharge and recharge areas for ground water within watersheds as well, acting to buffer surface water flows throughout the year by providing long- and short-term storage (Federal Interagency Committee for Wetland Delineation 1989, Mitsch and Gosselink 1993). Proportionally, they provide habitat for a greater diversity and density of wildlife and plant species than do adjacent uplands, and are crucial for maintaining habitat for healthy fisheries (Logan and Fletcher 1997). Riparian and wetland zones in the West help maintain the tentative balance in an environment where water, which is often the most limiting factor, may also represent the most destructive force on the landscape. A degraded riparian and wetland system is often incapable of many of these functions, sometimes compromising the health of an entire drainage system.

Riparian and wetland zones receive a disproportionate amount of "use" for the 1-5 percent of the landscape that they occupy (USDI Fish and Wildlife Service 1984). Estimates in 1978 indicated that less than 50 percent of the original riparian habitat in the United States remained and 6 percent of this remnant is lost annually (US Environmental Protection Agency 1993). Timber harvesting practices, livestock grazing systems, recreational use programs, agricultural practices, even roads and housing developments contribute to the overall degradation and destruction of the remaining riparian and wetland network which persists on the landscape today. Wetlands and riparian zones, which represent some of the most productive areas on the landscape, are often subject to the most intense usage, and are some of the least understood sites in terms of structure, function, and proper management. Land managers are now being held responsible for maintaining proper health and function of these sites. This requires identification of the forces at work in an ecosystem and the documentation of change in these systems over time.

Historical Perspective

Westward expansion of the United States has depended heavily on wetlands and riparian systems. Wetlands represent some of the most productive sites on the landscape, abounding with fish, game, and other natural resources. This fact lead pioneers to these sites as they colonized the West and founded new settlements. Dense riparian forests were a primary source of fuel and provided timber for the construction of towns, mines, boats, and railroads. Once drained and cleared, these same areas offered prime farmland on fertile, alluvial soils and ready access to water for irrigation. Waterpower could be harnessed by mills for timber, mining, and agriculture operations. The network of rivers and streams served as a principal mode of transportation for settlers and their commodities. Lewis and Clark mapped the first transcontinental route following the Missouri and Columbia Rivers (Ambrose 1996).

Ultimately, this rapid expansion exacted a heavy toll on the nation's riparian and wetland resources. Approximately 215 million acres of wetlands existed in the continental United States in the 1600's. By the mid-1970's, only an estimated 99 million acres, a loss of 54 percent of the country's indigenous wetlands, remained as such. Close to 9 million acres were converted from wetland during the 20 years from the mid-1950's to the mid-1970's (USDI Fish and Wildlife Service 1984). Approximately 80 percent of this loss of wetland (440,000 acres per year) was conversion to agriculture (Feierabend and Zelazny 1987). Between the mid-1970's and the mid-1980's, the United States lost 2.6 million acres (4,000 square miles) of wetlands. On average, the lower 48 states have lost more than 60 acres of wetlands for each hour that has passed between the 1780's and the 1980's. California has lost 91 percent of its historic wetlands; Ohio has lost 90 percent; Iowa, 89 percent; Indiana and Missouri, 87 percent; the prairie pothole region of the United States and Canada, the most productive waterfowl breeding area in the world, has lost 65 percent (Mitsch and Gosselink 1993).

In addition to drainage, other human activities have greatly changed the structure and function of riparian and wetland areas. Improper timber harvesting, mining, and livestock grazing have had severe impacts on riparian zones. Wetlands and aquatic systems near many farms have become eutrophic from barnyard and feedlot runoff. Fires have been suppressed, allowing dry vegetation to accumulate in many riparian and wetland areas. Ephemeral riparian areas were often cultivated, some even during wet years when soils are susceptible to compaction. In some areas, wetlands provide a source of hay or bedding for livestock and have been mowed as often as possible. Some wetlands were burned in the fall to reduce snow accumulation or to discourage the spread of weeds. More recently, cultivation of steep slopes, plowing for row crops, and the practice of summer fallowing promote erosion of topsoil into riparian areas (Kantrud 1986). Dissolved salts and residues from agricultural chemicals are transported into some riparian zones during rainstorms or spring runoff, and irrigation modifies the underlying hydrology of other wetland systems.

Why is There Suddenly a Problem?
Research over the past few decades has demonstrated many economic and social values that are enhanced by the proper function of riparian and wetland systems. We have learned some of the ways that impacts are made on these systems, and how difficult restoration can sometimes be. It is in our best interest as managers and landowners to make use of the growing body of knowledge at hand. One such asset is *Caring for the Green Zone* (Adams and Fitch 1998), a guidebook for ranchers and livestock producers on how to manage most effectively the riparian areas within their rangelands.

Benefits of a Healthy and Productive Riparian Area
Background—In a broad sense, the "health" of a riparian or wetland area may be defined as its ability to perform its normal functions. These functions include sediment filtering, streambank building, storing water, aquifer recharge, providing fish and wildlife habitat, and dissipating stream energy. However, not all riparian and wetland systems perform every function and should not be judged according to one set of standards. For instance, a sedge-dominated meadow may stabilize streambanks, filter sediments and offer forage for wild ungulates and livestock, but not provide hiding and thermal cover. The meadow is not unhealthy but merely lacks a tree or shrub layer. Evaluating the health of a riparian and wetland area must take into consideration the type of site being assessed.

Vegetation—The condition of the vegetation along a stream can serve as an indicator of health of the riparian ecosystem. Healthy riparian vegetation stabilizes streambanks and reduces potential for erosion during high flows. It also strengthens bank integrity and reduces damage from ice, log debris, and animal trampling (Karr and Schlosser 1978, Platts 1979, Marlow and Pogacnik 1985). Plant roots, especially trees and shrubs, stabilize streambanks and help to form overhangs as cover for aquatic organisms. Streambank stabilization is important because much of a stream's sediment load results from bank erosion. Schlosser and Karr (1981) discovered that levels of suspended solids increased rapidly during storm events when the streambanks were devoid of vegetation. In more stable channel sections with well-developed riparian vegetation, they found levels of suspended solids increased at a slower rate. Vegetation along streams also reduces flow velocity and erosive energy during floods (Schumm and Meyer 1979).

Riparian vegetation provides shade, mitigating water temperature fluctuations often harmful to aquatic life (Meehan and others 1977). Reduction in temperatures increases the water's oxygen-carrying capacity. Vegetation removal can cause an increase in water temperature that may adversely affect some trout species that require well-oxygenated water for survival.

Water Quality and Quantity—Riparian areas can improve water quality by filtering nutrients and fine particles. Nutrient filtering by riparian zones in agricultural regions can help control agricultural nonpoint-source pollution (Lowrance and others 1985). Although sediment deposition is a natural process during flooding, accelerated upland erosion can increase deposition in riparian and wetland areas through downslope movement of dislodged soil material. Such deposition can alter the soils, drainage, and vegetation in riparian or wetland areas (Lowrance and others 1985).

Another important role of wetland vegetation is uptake and long-term storage of nutrients. Riparian and wetland areas are more productive than adjacent uplands because of the nutrient and water subsidies provided by periodic flooding (Brinson and others 1980). Rapid nutrient cycling is common in areas dominated by deciduous vegetation. The high, annual litterfall and generally wet conditions result in soils high in organic matter.

Riparian and wetland ecosystems can often dissipate water and wind energy, thereby protecting nearby agricultural land. In the Great Plains, gallery forests are important natural windbreaks. Riparian and wetland areas are important in dissipating the energy of runoff from agricultural land. In general, surface runoff is slowed as it flows through the riparian zone, causing sediment deposition and diminishing the water's further erosive potential.

The loss of wetlands is responsible, in part, for the change from perennial to intermittent flow regime in some streams. Many aquifers in the western United States associated with alluvial systems are maintained by infiltration of upland runoff through the stream channel or floodplain deposits. These aquifers provide an important source of water for human use. Water stored in such aquifers once provided perennial flow in some western rivers, which are now dry beds for part of the year.

Fisheries and Aquatics—Riparian areas are important to instream communities. Riparian vegetation produces as much as 90 percent of the organic matter necessary to support stream (aquatic) communities (Campbell and Franklin 1979). In forested ecosystems, up to 99 percent of the instream biotic energy input may come from bordering riparian vegetation, with only 1 percent coming from instream photosynthesis by algae and mosses (Cummins 1974). Even in large rivers as much as 54 percent of the organic matter ingested by fish comes from riparian vegetation (Kennedy 1977).

Wildlife Uses—Riparian and wetland ecosystems are our most productive wildlife habitats, benefiting the greatest number of species (Ames 1977, Hubbard 1977, Patton 1977). In western Montana, 59 percent of the land bird species use riparian and wetland habitats for breeding purposes and 36 percent of those breed only in riparian or wetland areas (Mosconi and Hutto 1982). Thomas and others (1979) reported that of the 363 terrestrial species known to occur in the Great Basin of southeastern Oregon, 299 are either directly dependent on riparian or wetland areas, or utilize them more than any other habitats. The importance of riparian and wetland ecosystems is not limited to animal species restricted to the riparian or wetland zone. Population densities of birds in upland habitats adjacent to the riparian or wetland zones are greater in the proximity of riparian or wetland areas (Carothers 1977). When a riparian or wetland area is degraded, not only the riparian and wetland species are affected, but also the wildlife in the adjacent uplands are impacted as well.

Livestock Grazing—Riparian and wetland areas are vitally important to the livestock industry. Livestock often congregate in riparian and wetland areas and utilize that vegetation much more intensively than on the adjacent uplands (Kauffman and Krueger 1984). Reid and Pickford (1946) reported that moist meadow soils in riparian and wetland zones in northeast Oregon are so highly productive that one acre has the potential grazing capacity equal to 10-15 acres of forested uplands. Although riparian and wetland areas cover only about 1-2 percent of the summer range area of the Pacific Northwest, they can potentially produce 20 percent of the summer range forage (Reid and Pickford 1946, Roath and Krueger 1982).

Cattle tend to use riparian and wetland areas for the same reasons other animals do: availability of water, shade, and quality forage (Ames 1977, Severson and Boldt 1978). Many sedge species retain relatively constant crude protein levels until the first killing frost. Several sedges found in riparian and wetland zones of the Pacific Northwest exceed key upland forage species in sustained protein and energy content (Kauffman and Krueger 1984). In the Blue Mountains of Oregon, Roath and Krueger (1982) found that because of limits on livestock movements caused by steep slopes and uneven distribution of watering areas away from the creek, the riparian zone (covering about 2 percent of the Blue Mountain grazing allotment) accounted for 81 percent of the total herbaceous vegetation removed by cattle.

Grazing practice can greatly effect vegetation, causing decreased vigor and biomass, and often a shift of species composition and diversity (Ames 1977, Bryant and others 1972). Improper livestock use of riparian areas can change, reduce, or eliminate vegetation along the stream. Channel morphology can be changed by widening and shallowing of the streambed, gradual stream channel trenching, or braiding, depending on soils and substrate composition (Marcuson 1977, Platts 1979). Water quality itself can be altered by increasing water temperatures, nutrients, suspended sediments, bacterial counts, and by altering the timing and volume of water flow (Platts 1979, Kauffman and Krueger 1984). Overgrazing can cause banks to slough off, accelerated sedimentation, and subsequent silt degradation of spawning and food producing areas (Platts 1979, Platts 1981). Hayes (in Kauffman and Krueger 1984) found that high forage removal, high amount of foraging time along banks, and high percentages of palatable sedges along the banks all contributed to a significant increase in the probability of sloughing occurring during the grazing season.

The excessive utilization of woody vegetation can degrade the health of riparian and wetland areas (Kauffman and Krueger 1984). Knopf and Cannon (1982) found that excessive cattle grazing significantly altered the size, shape, volume, and number of willow stems. Cattle grazing was also found to influence the spacing of plants and the width of the riparian or wetland zone. Marcuson (1977) found shrub production to be 13 times greater in an ungrazed area than in a severely overgrazed area. Canopy cover was 82 percent greater in the ungrazed area. A change in management on the site can dramatically restore lost shrub canopy cover (Crouch 1979, Davis 1982, Kauffman and Krueger 1984, Hansen 1985).

Improper livestock grazing can adversely affect these sites for wildlife, significantly reducing bird species composition and foraging guilds, as well as small mammal density and diversity (Kauffman and Krueger 1984). Alderfer and Robinson (1949), Bryant and others (1972), Orr (1960), and Rauzi and Hanson (1966) all found soil compaction increased linearly with increases in grazing intensity.

However, recent advancements in grazing systems have successfully rehabilitated many riparian and wetland areas. The damage caused by hot season use or season-long grazing is well documented (Marcuson 1977, Severson and Boldt 1978, Windell and others 1986, Platts and others 1987), but specialized grazing schemes hold promise for rehabilitating riparian and wetland areas without excluding cattle for long periods (Kauffman and Krueger 1984). In a study in northeastern Oregon, Bryant (1985) found herbage production increased one- to four-fold through proper timing and intensity of grazing.

Summary—Even though representing only a minor percentage of the landscape, riparian and wetland ecosystems play a significant role in all facets of life in the American West. The presence of additional water in a moisture-limited environment typically results in higher diversity and density of plant and animal species than is found on adjacent uplands. Management strategies must accommodate diverse land usage while protecting resource values and maintaining or restoring integrity of the riparian and wetland systems. Proper management of riparian and wetland areas should promote growth in wildlife and fisheries resources (Duff 1979, Van Velson 1979), decrease streambank erosion and floodplain losses (Gunderson 1968, Marcuson 1977), increase forage production for livestock (Pond 1961, Kauffman and Krueger 1984), improve water quantity and quality, and sustain recreational opportunities.

The Problem of Defining Wetlands in the West

Defining the boundaries of wetlands, referred to as "delineation" in the United States, became important when society began to recognize wetland values (Mitsch and Gosselink 1993). In the nineteenth and twentieth century, when wetland draining was a common practice and accepted by society, a precise wetland definition was not important. Wetland draining continued unabated into the late 1960's. When the first national laws and regulations pertaining to wetland protection were written, the need for precision increased as it became apparent that definitions affected land use options.

The introductory statement of Cowardin and others (1979) remains a challenge:

There is no single, correct, indisputable, ecologically sound definition for wetlands, primarily because of the diversity of wetlands and because the demarcation between dry and wet environments lies along a continuum. Because reasons or needs for defining wetlands also vary, a great proliferation of definitions has arisen including structural attributes, functional considerations, and jurisdictional criteria.

Wetland Definitions—The earliest definition of wetlands was intended for managers and scientists, particularly those concerned with waterfowl and wildlife (Shaw and Fredine 1956):

The term wetlands . . . refers to lowlands covered with shallow and sometimes temporary or intermittent waters. They are referred to by such names as marshes, swamps, bogs, wet meadows, potholes, sloughs, and river overflow lands. Shallow lakes and ponds, usually with emergent vegetation as a conspicuous feature, are included in the definition, but the permanent water of streams, reservoirs, and deep lakes are not included. Neither are water areas that are so temporary as to have little or no effect on the development of moist-soil vegetation.

The definition of Shaw and Fredine (1956) established two parameters necessary for a site to be considered a wetland: 1) the presence of surface water, and 2) the development of moist-soil vegetation (Kent 1994). Twenty-three years later at a workshop of the Canadian National Wetlands Working Group, a definition evolved which recognized hydric soils as a third parameter, and which noted the functional attributes of wetlands (Tarnocai 1979). In addition, it expanded the previous definition of wetlands to include not only those habitats with surface water, but also those having saturated soils:

Wetland is defined as land having the water table at, near, or above the land surface or which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophilic vegetation, and various kinds of biological activity which are adapted to the wet environment.

That same year, the USDI Fish and Wildlife Service adopted a definition, which also recognized wetland hydrology, hydric soils, and hydrophytic vegetation as defining parameters (Cowardin and others 1979). The USDI Fish and Wildlife Service definition is different from the Canadian definition in that a wetland does not have to exhibit characteristics of all three parameters: *Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water . . . Wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes, 2) the substrate is predominantly undrained hydric soil, and 3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.*

As a summary of literature, Windell and others (1986) provide a general definition:

The term wetland is a catch-all that includes units on the landscape such as marshes, swamps, bogs, fens, and lowlands covered with shallow and sometimes ephemeral or intermittent waters. The term wetland also includes wet meadows, potholes, sloughs, the riparian zone, and river-overflow areas. Shallow lakes and ponds, usually with emergent vegetation as a conspicuous feature, are included in the wetland definition. Permanent waters deeper than 2 m (6.6 ft) are not included.

Formal classification systems provide a means to clarify definitions. The primary objective of *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin and others 1979) was, "to impose boundaries on natural ecosystems for the purposes of inventory, evaluation, and management." The classification provides a major contribution for upper levels of a taxonomic hierarchy. However, it did not resolve the need for a single acceptable definition for lower levels in the hierarchy—a level of primary concern for practical on-the-ground management applications.

The USDI Bureau of Land Management, in their Technical References TR 1737-9 and TR 1737-11 (Prichard and others 1993; Prichard and others 1994), defines riparian areas and wetlands in the following manner:

Riparian areas are a form of wetland transition between permanently saturated wetlands and uplands. The areas exhibit vegetation or physical characteristics that reflect permanent surface or subsurface water influence. Typical riparian areas include such areas as lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, glacial potholes, and shores of lakes and reservoirs with stable water levels. Riparian areas do not include ephemeral (permanently above the water table and flows only during or immediately after a rainstorm or snowmelt) streams that do not exhibit the presence of vegetation dependent upon free water in the soil.

Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Typical wetlands include marshes, shallow swamps, sloughs, lake shores, bogs, wet meadows, and riparian areas.

Defining wetlands has become more difficult as greater economic stakes have increased the involvement of politics and reduced the science. A universally accepted wetland definition satisfactory to all users has not yet been developed because such a definition would require agreement from differing fields of interest. Scientists generally agree that wetlands are characterized by one or more of the following features: 1) ***wetland hydrology,*** the driving force creating all wetlands, 2) ***hydric soils,*** an indicator of reduced presence of oxygen, and 3) ***hydrophytic vegetation,*** an indicator reflecting wet site conditions. The problem is how to define and obtain consensus on thresholds for these three criteria and various combinations of the three criteria.

Running Water (Lotic) Wetlands vs. Still Water (Lentic) Wetlands—In the semiarid and arid interior West, a useful distinction has been developed based on association with different aquatic ecosystems. Several authors have used lotic and lentic to separate wetlands associated with running water from those associated with still water. The following definitions represent a synthesis and refinement of terminology from Shaw and Fredine (1956), Stewart and Kantrud (1972), Boldt and others (1978), Cowardin and others (1979), American Fisheries Society (1980), Johnson and Carothers (1980), Cooperrider and others (1986), Windell and others (1986), Environmental Laboratory (1987), Kovalchik (1987), Federal Interagency Committee for Wetland Delineation (1989), Mitsch and Gosselink (1993), and Kent (1994).

Lotic wetlands are associated with rivers, streams, and drainageways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit, which periodically, or continuously, carries flowing water, dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the lotic wetland.

Lentic wetlands are associated with still water systems. These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (e.g., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel.

PHYSICAL SITE FEATURES OF THE IDAHO STUDY AREA

Geology

The study area is divided among three distinctly different geologic regions: the Idaho Batholith occupies the northwestern corner in central Idaho, the Basin and Range characterizes the southeastern corner along the Utah and Wyoming borders, while the Snake River Plain composes a wide swath angling from the south central part of the state up to the northeast corner near Yellowstone National Park (Fig. 1). The Idaho Batholith is a granitic formation, the result of colliding lithospheric plates and the upwelling of hot magma. The Basin and Range Region is a product of two superimposed mountain ranges and the forces, which led to their creation and subsequent deformation. The Snake River Plain is primarily the result of volcanic activity that started some 13 million years ago. Glaciation during two separate ice ages, although responsible for scouring much of the landscape to the north in Montana and northern Idaho, and along the higher ranges to the east and south in Wyoming and Utah, did not play a significant role in the development of the topography in this area (Alt and Hyndman 1989).

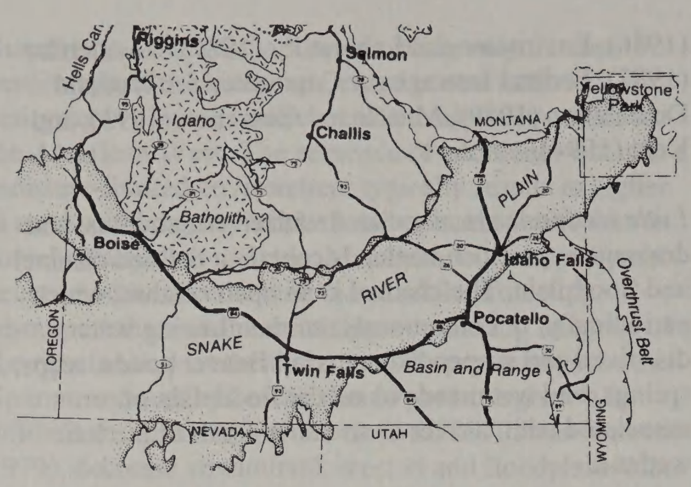

Figure 1. Geologic Regions of Central and Southern Idaho (Alt and Hyndman 1993)

Idaho Batholith—A chain of volcanoes formed along the southwestern edge of Montana where granite magma spewed forth onto the surface. However, much of the granite magma in central Idaho, and some in western Montana did not erupt, but formed subterranean reservoirs, which crystallized in place. As the mountain range continued to settle, subsequent eastward movement of rock slabs from the higher mountain ridges sheared off the overburden on these deposits, revealing the sheets of granite beneath. These granite complexes are generally referred to as the Idaho Batholith. The northwestern edge of the study site overlaps the southeastern edge of the Idaho Batholith (Alt and Hyndman 1989).

Basin and Range Region—The majority of the rock in the Basin and Range Region of southeastern Idaho is classified as sedimentary, formed some time during the Precambrian Era (greater than 600 million years ago) when oceans covered much of the landscape and deposited extensive layers of sand and silt. Successive continental submergence and subsequent depositions in the Paleozoic Era (250-600 million years ago) accounts for most of the remaining limestones and sandstones present in the area. The ridge and valley topography characteristic of this region, however, is inconsistent with either the level terrain expected with oceanic deposition, or the formation of the massive peaks observed along the Rocky Mountain front (Alt and Hyndman 1989).

The first phase in the formation of the Basin and Range Region occurred with the creation of the Rocky Mountains. The existing oceanic deposits from the Precambrian and Paleozoic eras were crumpled and uplifted during the formation of the mountain range 70-90 million years ago. The second phase in the development of the Basin and Range Region commenced about 17 million years ago when a giant meteorite struck the earth in southeastern Oregon. It passed through the continental crust, the outer portion of the lithosphere, and penetrated the upper layers of the underlying mantle. The impact induced a fracture in the mantle, which persists today. This rift, extending southward from its origin, relieves pressure on the hot rocks forming the mantle, allowing them to partially melt to viscous, molten rock, and fill the breach. During its migration westward, the North American continental plate passes over this rift or fault. The crust above the rift warms, separates as a block or wedge, and settles slightly into the fault. As the plate continues its journey westward, the block heels over, rotating onto its side and pitching so that the leading edge drops while the trailing edge rises. The resulting wedges or blocks overlap one another much like shingles on a roof, forming a series of parallel ridges and valleys in a north to south direction aligned with the fault line. The blocks continue to spread apart as the continental plate progresses west, exposing more of the cross section or side of each block. The result of this block faulting over time has been the gradual accordion expansion of the Rocky Mountains into a series of smaller, parallel ridges and intervening valleys. The ridges appear as exposed, stratified sedimentary rock, eroded over time by wind and water. The valleys are generally blanketed with a layer of alluvium, a collection of eroded mineral materials and lake bottom sediments deposited by river floods and Lake Bonneville, an enormous inland lake which probably appeared during the warming trends at the conclusion of each of the last two ice ages, approximately 100,000 and 15,000 years ago, respectively (Alt and Hyndman 1989).

Snake River Plain—The Snake River Plain, the third of the geologic regions represented in the study area, is composed primarily of white rhyolite overlain with a thin veneer of black basalt. The rhyolite originated from a chain of volcanoes that emerged some 13 million years ago, but have long since been extinct. The source for this volcanic activity can be traced back about 17 million years, again to the collision of the meteorite (Alt and Hyndman 1989). The explosive force of the impact formed a deep crater, which filled with magma from the underlying mantle and formed a lava lake. Pressure-invoked eruptions emptied the lake periodically, although subsequent resurgence of magma refilled the crater after each discharge. This cyclical process continued for about 4 million years. At that time, the intact portion of the North American continental plate east of the lake, which had not been shattered from the collision with the meteorite, began to slid across and cover the crater during its slow progression westward. The underside of the lithosphere which came in contact with the lava lake melted into rhyolite magma. The crust continued its westward progression and a chain of volcanoes formed. Craters or cones developed where the excessive pressure and heat of the lava lake breached weak locations in the overlying crust, and rhyolite magma spewed forth, covering the surrounding country, present day south central and northeastern Idaho. The actual point of impact of the meteorite on the mantle can be traced along the extinct chain of volcanoes to the present day geysers in Yellowstone National Park in Wyoming (Alt and Hyndman 1989).

The thin facade of basalt 3-15 m (10-50 ft) covering the main body of rhyolite is the result of comparatively recent (geologic time frame; about 1,600 years) basalt lava flows that emanated from fissures and vents extending roughly southeast from Craters of the Moon National Monument to American Falls (Alt and Hyndman 1989). Although the basalt represents only a minor fraction of the rock present in this region, it is a predominant surface layer in many locations and may constitute a primary source of parent material in these areas.

Physiography

The study area encompasses land administered by the Upper Snake River District Office of the USDI Bureau of Land Management (the former Idaho Falls, Shoshone and Burley Districts) in southeastern and south central Idaho. It is bounded by the Continental Divide at the Idaho/Montana border to the north, and the Idaho/Wyoming border along the Teton Range, Snake River Mountains, and Salt River Range to the east. The boundaries to the south and west are less obvious, physiographically. To the south, it is delineated by the Idaho/Utah and Idaho/Nevada borders which run along an east/west axis bisecting a series of parallel, block-faulting ranges aligned north/south. The western boundary, just to the west of Twin Falls and U. S. Highway 93, courses north from the Nevada border near Idavada. It overlaps the Salmon Falls Creek Canyon to its intersection with the Snake River Canyon, then continues northwest along the Snake River Canyon to an area just west of King Hill. The boundary then angles north, following the Elmore/Camas county line, and turns east at the northeast corner of Elmore county, where it parallels the southern boundary of Custer County, progressing essentially southeast toward the Craters of the Moon National Monument. It then bends northeast, along a sinuous route along the Custer and then Lemhi county lines, where it converges with the Continental Divide approximately 40 km (25 mi) west of Monida Pass on the Idaho/Montana border (Fig. 2).

This area overlaps portions of four physiographic provinces described by Fenneman (1931): 1) the Northern Rocky Mountain Province, 2) the Middle Rocky Mountain Province, 3) the Great Basin Section (Basin and Range Province), and 4) the Snake River Plain Section (Columbia Intermountain Province). For the purposes of the geologic discussion, the Middle Rocky Mountain Province is included within the Basin and Range geologic region. The southeastern portion of Idaho lies on the boundary of the Middle Rocky Mountain and the Basin and Range Provinces, where a series of active block faults are tearing apart the Rocky Mountains. The location of these faults and the interpretation of their influences has led to some conflicting boundary designations for the different physiographic provinces in this area. Although the Middle Rocky Mountain and Basin and Range Provinces are treated separately in this section, there is much geologic overlap.

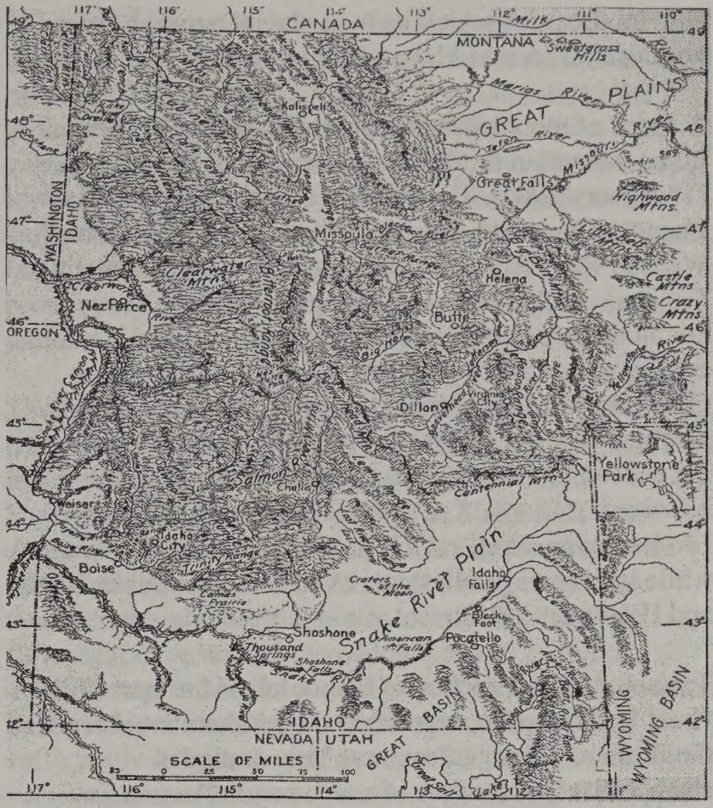

Figure 2. Physiography of the Idaho Study Area

The Northern Rocky Mountain Province applies to those portions of the study area in central Idaho associated with the Idaho Batholith, and adjacent mountainous areas north and west of the Snake River Plain. The foothills and southern peaks of the Soldier, Smoky, Pioneer, and White Knob Mountains represent the western boundary of the study area in central Idaho. Rather than definitive ranges, these mountains appear as a complex of ridges and valleys, lacking any real directional alignment in their topography (Fenneman 1931). Peaks are of uniform height and may reach elevations of 3,030-3,333 m (10,000-11,000 ft) at their uppermost limit. The overall topography is generally quite steep and dendritic, with narrow intervening valleys that may be 606-1,515 m (2,000-5,000 ft) below the adjoining ridges. The adjacent Lost River and Lemhi Ranges, north of Arco, drain into the Snake River Plain from the northwest. As their names suggest, these are ranges separated by broad valleys, atypical of topography in the Northern Rocky Mountain Province. Like their counterparts, however, they reach comparable elevations and are characterized by steep, sideslope gradients. The Continental Divide follows the Centennial Mountains, which split Idaho and Montana, and establish the northern boundary of the study area. This range, also characterized by steep gradients and ravine-like valleys, does not achieve the higher elevations of the central Idaho mountains, with the tallest summits approximately 2,424 m (8,000 ft). Parent materials for the Northern Rocky Mountain Province are variable due to a history of periodic magma intrusions, but are typically dominated by granitics, most commonly quartz monzonite (Thornbury 1965). Valley bottoms are covered with alluvial deposits, which include glacial outwash from northcentral Idaho (Alt and Hyndman 1993).

A series of mountain ranges in the southeast corner of Idaho are within the Middle Rocky Mountain Province (Thornbury 1965). The combined Wasatch, Bear River, Bannock, Portneuf, Pruess, Caribou, Snake River, and Webster Ranges and the Blackfoot Mountains constitute this chain of the Rocky Mountains in Idaho. These mountains are characterized by steeply inclined western exposures and more gradually sloping, eastern faces (Thornbury 1965). Although a number of peaks attain heights just short of 3,030 m (10,000 ft), most ridges do not exceed 2,424 m (8,000 ft). Valleys are generally between 1,212-1,818 m (4,000-6,000 ft) in elevation. Eroded sedimentary rock is predominant on ridgelines while intervening valleys are overlain with alluvium (Alt and Hyndman 1989).

The southcentral portion of Idaho, labeled as part of the Great Basin section, represents the northern most reach of the Basin and Range Province. This section is characterized by a series of short, parallel mountain ranges and intervening valleys with a generally north/south orientation, evidence of the active block faulting characteristic of this subdivision. The main mountains in this area are the Albion, Black Pine and Deep Creek Mountains, and the Sublett Range. Although Cache Peak in the Albion Mountains rises to 3,133 m (10,339 ft), most of these ranges seldom manage heights greater than 2,424 m (8,000 ft). Valley elevations range from approximately 1,212-1,818 m (4,000-5,000 ft). Sedimentary deposits are dominant in southern Idaho, although igneous intrusions and alluvial fill are present in valleys. Although most of the Great Basin has internal drainage to the Great Salt Lake, this portion in Idaho drains north to the Snake River (Thornbury 1965).

The Snake River Plain Section represents the eastern most lobe of the Columbia Intermountain Province (Thornbury 1965). Level lava plains, primarily rhyolite with a thin, surficial facade of basalt, dominate most of the area. The plains slope to the west, from about 1,818 m (6,000 ft) elevation northeast of Ashton to about 1,060 m (3,500 ft) in the southwest near Twin Falls. Some lava fields, such as the Craters of the Moon complex (1,681 sq. km/[643 sq. mi]), which are only a few thousand years old, are highly resistant to weathering and may appear much as they did at the time of their development. Older fields have been subjected to erosion and deposition, may offer rich, deep soils. Extinct volcanic cones and calderas occur sporadically throughout the region. A complex of sand dunes northwest of St. Anthony, the St. Anthony Dune Field (454 sq. km/[175 sq. miles]), represents another of the unusual features of this complex landscape (Alt and Hyndman 1989).

Watersheds—Two major watersheds may be defined within the study area: the Snake River and the Bear River. The Snake River is the most significant. Its northern branch, Henrys Fork, flows south from Island Park Reservoir in the northeast corner of the state. The South Fork of the Snake River, flowing northwest from the Palisades Reservoir is centrally located near the Idaho/Wyoming border and merges with the Henrys Fork, at the Menan Buttes to form the main stem of the Snake River. The Snake proceeds southwest, where it is joined by the Blackfoot River, and on through the American Falls Reservoir. It flows due west across the southern portion of the Upper Snake River District before angling northwest toward Boise. The Snake River captures most of the precipitation south and west of the Continental Divide in this region and supplies five major reservoirs (Henrys Lake, Island Park, Palisades, Blackfoot, and American Falls) and more than 20 minor lakes and reservoirs, in addition to countless perennial and intermittent tributaries which join it. Basalt in the Snake River Plain is extremely porous and often characterized by joints, lava tubes and unconsolidated layers, which promote percolation and subsurface flow. Rivers such as the Big Lost and Little Lost, and Birch Creek, located northwest of the lava fields, virtually disappear upon entering the plains, to reemerge at the thousand springs canyon head wall west of Twin Falls.

The second watershed, the Bear River, is the primary outlet for Bear Lake, and serves as the main outlet for the southeast corner of Idaho. It flows north, diverting around the end of the Bear River Range, the northern extent of the Wasatch Mountains Range, before proceeding south to drain into the Great Salt Lake in northern Utah (Delorme 1992).

Floristic Patterns

Cronquist and others (1972) describe three general floristic divisions (Fig. 3) for the study area within the intermountain region that parallel the physiographic provinces described by Fenneman (1931). The Wasatch Mountains section generally applies to the area classified as the Middle Rocky Mountain Province, the Bonneville Basin section applies to the Great Basin Section (Basin and Range Province) while the Snake River Plain Section remains consistent in name and overall area for both floristic and geologic classification.

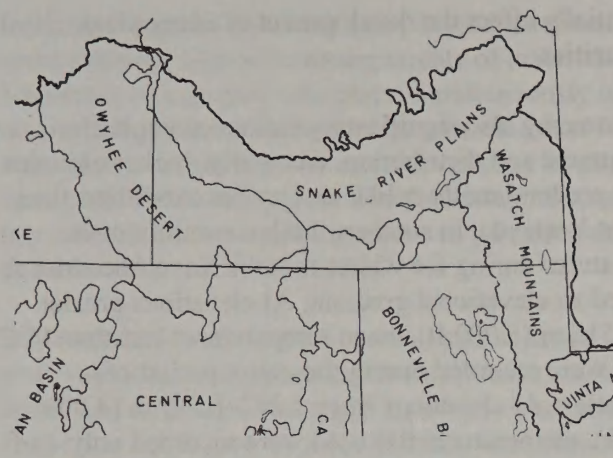

Figure 3. Intermountain Region illustrating Floristic Sections for the Study Area (Cronquist and others 1972)

The Wasatch Mountains floristic section encompasses the Bannock Range to the west, the Blackfoot Mountains and Caribou Range to the north and all of the intervening country bounded to the east and south by the Wyoming and Utah state lines. Two vegetation zones are present in this Division: Montane and Sagebrush. The Montane Zone emerges on the upper slopes, ridges, and ravines of mountain ranges where sufficient moisture is present. *Pseudotsuga menziesii* (Douglas fir) is the dominant species in this alpine zone, although *Pinus contorta* (lodgepole pine), *Abies concolor* (white fir), *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce) and/or *Populus tremuloides* (quaking aspen) may dominate localized sites (Cronquist and others 1972). *Acer grandidentatum* (bigtooth maple) and/or *Juniperus scopulorum* (Rocky Mountain juniper) woodlands are common at lower elevations. The Sagebrush Zone is present within the broad valleys and lower foothills between ranges where moisture is a limiting factor. *Artemisia tridentata* (big sagebrush) dominates communities in this zone, often with a mixture of other *Artemisia* species (sagebrush) and *Chrysothamnus* species (rabbitbrush). Graminoids, particularly *Agropyron spicatum* (bluebunch wheatgrass) and *Festuca idahoensis* (Idaho fescue), may occupy some areas and constitute prominent understory species in some locations (Cronquist and others 1972).

The Bonneville Basin floristic section, applicable to the Basin and Range Province, occurs west of the Wasatch Mountains Division and extends to the western edge of the study area, just west of Twin Falls. The northern and southern boundaries essentially coincide with the Snake River Canyon and the Utah state line, respectively. Three vegetation zones are present here: 1) Montane, 2) Pinyon-Juniper, and 3) Sagebrush. The distribution of the montane zone is restricted to the ridgelines at higher elevations and constitutes only a minor floral division here. The other alpine zone, the Pinyon-Juniper, occurs at the northernmost extent of its range, for the pinyon component which is prevalent further south in Utah, is essentially absent here. Instead, communities are dominated primarily by *Juniperus scopulorum* (Rocky Mountain juniper) and *Juniperus osteosperma* (Utah juniper). This zone often dominates lower mountain ranges and is generally restricted from colonizing the broad valley bottoms due to moisture limitations. *Acer grandidentatum* (bigtooth maple) may also persist on the lower foothills. The Sagebrush Zone dominates most valley bottoms and grades into the Pinyon-Juniper forests. In fact, *Artemisia tridentata* (big sagebrush) may be the prominent understory shrub affiliated with these open juniper woodlands (Cronquist and others 1972).

The Snake River Plain floristic section applies in both title and physical location to its geologic counterpart. Two major vegetation zones occur within this region: Sagebrush and Absolute Desert. The Sagebrush Zone dominates the level plains, which, in combination with rainfall levels of less than 25 cm (10 in) per year, are considered high desert in many locations. Older lava flows that have undergone pedogenesis (e.g., solid development) and are covered with alluvium may develop thick, rich soils suitable for agriculture crops, if sufficiently irrigated, such as sugar beets, potatoes, and various grains. *Pseudotsuga menziesii* (Douglas fir) and *Pinus flexilis* (limber pine) may inhabit the pinnacles of taller cinder cones scattered across the plains, but represent only an incidental floristic component (Cronquist and others 1972). Absolute Desert is technically not considered a vegetation zone, but rather a non-vegetation zone. Some of the lava fields, such as the Craters of the Moon complex, are so recent (less than 2,000 years old) that they have not yet attained any soil development, appearing much as they did shortly after the time of their emergence as bare rock. Due to the porous nature of basalt, water percolates through rather than across it, making it essentially impervious to the effects of erosion on a short-term geologic scale (Alt and Hyndman 1989).

Climate

The state of Idaho, in its entirety, lies west of the Continental Divide. Idaho is affected by a maritime climate even though it is approximately 486 km (300 mi) east of the Pacific Ocean (Gale 1978). This influence is evident particularly during the winter months as weather patterns tend toward greater cloud cover, warmer temperatures, and elevated precipitation levels, as compared to regions at similar latitudes further inland, east of the Continental Divide. However, eastern Idaho is considered more under the influence of a continental climate than either the northern or the central parts of the state. The eastern and southeastern regions of the state are characterized by a wider range of temperatures between the summer and winter months due to mountain ranges in the southern and central region acting as barriers to the movement of moderating oceanic air masses from west to east. Moisture received in this area originates over the Pacific Ocean and is carried across the continent on westerly winds. Most of it is released on the intervening mountain ranges between the Continental Divide and the coast. Eastern Idaho generally receives more moisture in the late spring/early summer than in the winter. However, during the hot summer months, weather fronts may migrate north from the Caribbean and the Gulf of Mexico on high altitude systems to develop as thunderheads over the eastern part of the state. These summer squalls may produce flash flooding in southeastern Idaho, especially between Pocatello and Downy (Gale 1978).

The study area for this classification is quite diverse and is not governed by any single climatic regime over its entire range, even though fundamental patterns for the region may be perceived. Riparian zones in particular may not characteristically reflect local climatic conditions either. Padgett and others (1989) show that climate affects riparian zones much less directly than it does drier uplands. They suggest that climate has a more direct impact on the overall watersheds and, subsequently, the stream systems, instead. They note that drier regions in southern Utah tend to have narrower riparian zones and smaller wet meadow areas than regions further north or at higher elevations with greater precipitation and colder temperatures. They do stress that temperature plays a pivotal role in the distribution of wetland species and communities. Youngblood and others (1985b) also refute the overall effect of climate on riparian zones. They show that precipitation amounts and patterns exert little influence on the development of riparian communities, whereas they do dictate location and type of upland communities. They also note that temperature gradients can significantly influence local vegetation communities. For instance, extremely sharp gradients, as narrow as a few meters, can develop between upland and riparian areas where streamside zones and low, moist pockets collect cold air.

Weather station data can provide relative climatologic conditions for each area and illustrate the differences between regions. The average annual precipitation during 1961-1990 varies considerably between Island Park (75 cm [30 in]) in northeast Idaho and Burley (25 cm [10 in]) in south-central Idaho, although Pocatello (30 cm [12 in]) and Ashton (52 cm [21 in]), both somewhat more centrally located, diminish this gap. Mean annual temperature differences during 1961-1990 for Island Park (3° C [37° F]) and Burley (9° C [48° F]) are almost as extreme, with average annual minimum and maximums (Island Park -6° C [22° F], 11° C [52° F]; Burley 1° C [34° F], 16° C [61° F]) exhibiting as divergent results (University of Idaho Climate Data 1996). The length of the annual growing season may also provide some insight to regional variations in vegetation communities. Five years out of every 10, the average growing season (when temperatures do not drop below 0° C [32° F]) for Idaho Falls is 113 days but for Twin Falls, it is 138 days (University of Idaho Climate Data 1996). While the growing season must be correlated to daily temperature fluctuations and precipitation to determine the actual potential for growth, a difference of 25 days could substantially effect the development of many plant communities.

Elevation may also significantly influence vegetation development and distribution. Generally, higher altitudes exhibit predominantly colder and wetter conditions than adjacent lowlands. In southern Idaho, monthly mean temperatures during the winter months November-March reflected an elevational gradient. At elevations greater than 1,515 m (5,000 ft), mean temperatures less than 0° C (32° F) were recorded during the entire period of observation. At elevations from 1,212-1,515 m (4,000-5,000 ft), temperatures this cold were recorded only 4 of the 5 months, while at zones between 909-1,212 m (3,000-4,000 ft) temperatures this cold were recorded for only 3 months. At 606-909 m (2,000-3,000 ft), these sub-freezing temperatures persisted for only 1 or 2 months and at elevations of less than 606 m (2,000 ft) only for one month or not at all (Gale 1978). Monthly precipitation levels at weather stations near 2,121 m (7,000 ft) elevation were 65 cm (26 in). Rates recorded at other climate stations from 1,818-1,212 m (6,000-4,000 ft) indicated a declining trend from 45 to 20 cm (18 to 8 in), respectively (Baker 1944). Local influences and the placement of weather stations may bias some results, but general trends may provide useful insights. In terms of temperature and precipitation, elevation may exert considerable influence on the distribution patterns of local flora.

It should be stressed that the extreme variation between the different regions located within the study area make it difficult to emphasize any single predominant climatic factor or even multiple ones. General trends in the regional weather patterns may help to establish boundaries for, or explain discrepancies observed between, habitat types or community types and should be considered when comparing stands and sites from different areas of the study area.

Soils

Riparian and wetland areas are ecosystems that occupy the transition between upland and aquatic ecosystems. Within an ecosystem, soils may have a strong influence on the vegetation. These influences are often seen as differences in species composition, species coverage, or growth form, but the soil effects are often subtle compared to the primary influence of water. Most wetland scientists and managers interpret water regimes as the timing, duration, depth, and extent of flooding (Heitmeyer and others 1991). However, this can be misleading as some riparian and wetland areas never experience inundation by floodwaters. Rather, they can remain saturated for prolonged periods by ground water.

Soil Forming Factors—Soils are dynamic natural bodies having properties derived from the combined affect of climate and biotic activities as modified by topography, acting on parent materials over periods of time. Soil forming events include both complicated reactions and comparatively simple re-arrangements of material. Numerous events may take place simultaneously or sequentially that enhances or negates each other. It is important to emphasize the interdependency of all five factors on soil development. The following discussion of these five soil-forming factors have in part been expanded or modified from Brady (1984).

Parent materials of riparian and wetland soils are predominantly transported sediments. The exceptions are those seeps, springs, and occasional bogs where residual soils have developed. In most all other instances the soils of a riparian or wetland area have developed from the lateral or vertical accretion of sediments by alluvial, colluvial, glacial, lacustrine, or less commonly, aeolian processes. The most common, the alluvial deposits are often stratified by particle size. The size of particles of a deposit is a direct function of the velocity of the water at the time of deposition.

All other factors held constant, the mineralogical composition of the parent material determines the rate of weathering. Soil particle size (texture) is highly correlated to mineralogical composition. Sands are largely made up of the highly weather resistant mineral quartz, whereas the vast majority of clay sized particles are dominated by secondary silicate minerals (the silicate clays). The unique electro-chemical properties and tremendous surface area of these clays serve to increase the concentration of plant available nutrients and potential rate of physical and chemical processes.

Climate is perhaps the most influential of the five soil forming factors. Climate regulates the amount of water a site receives through precipitation and evaporation. In turn, moisture content of the soil influences the rate of the physical and chemical processes involved in soil development. Water affects soil in a number of ways.

Wet soils warm-up more slowly in spring and cool more slowly in autumn. Water adds weight to the soil and acts as a lubricant between soil particles, making wet soils more susceptible to damage. When soils are saturated, the spaces between soil particles are filled with water instead of air. Saturated soils are commonly oxygen deficient. Since air (oxygen) is essential to most lifeforms, saturated soil contains fewer lifeforms than unsaturated soils. Microorganisms are the most abundant lifeforms in the soil. They feed primarily on dead plant and animal remains. Wetlands produce comparatively higher amounts of plant material than adjacent upland areas, which commonly result in an accumulation of organic material at the mineral soil surface. These organic accumulations are called organic soils or in some specific instances, histic epipedons (a requirement of the soil order Histosols). Other common characteristics of wet soils are the presence of redox depletions (gleyed soil) and redox concentrations (mottles). Redox depletions result from a state of total lack of oxygen in the soil. This state is also called a reduced condition. Most soils in Idaho contain some iron. Iron in a reduced state (ferrous iron or soluble iron, Fe^{+2}), appears blue or gray in color. These saturated blue or gray soils are often called gleyed soils and the reduction process in the soil is called gleization. Redox concentrations are often an indication of poorly drained soils. Redox concentrations are segregations of the remaining oxidized iron (ferric iron, Fe^{+3}), in the soil when all other iron is reduced or has been removed by leaching. They appear as red or brown soft speckles, hardened nodules, or may line the inside of pores in the soil. They vary in size, shape, and differ in color from the dominant soil. A complete description of these characteristics of wet soils (redoximorphic features) is given in the document *Keys to Soil Taxonomy* (Soil Survey Staff 1994).

Air and soil temperatures are directly related to climate and can affect soil formation. Seasonal and diurnal temperature fluctuations (freeze and thaw) dictate the rate of physical weathering of soil particles. Cold temperatures restrict distributions of biotic communities, reduce biomass production, and slow decomposition rates. Typically, higher elevations are cooler. However, cold air ponding is common in high elevation valleys of the mountainous portions of the state. In the absence of wind, colder air pools and valley soil and air temperatures are lower than adjacent sites at higher elevations. The effects of cold air ponding are indicated by dramatic differences in spatial distribution of vegetation.

Organic matter accumulation and decomposition, nutrient cycling, development of soil structure, soil mixing and many other processes are all enhanced or diminished by both the flora and fauna living on or within the soil.

The amount of organic matter, in either the surface horizon or accumulating at the soil surface, is greater in riparian and wetland soils than in adjacent upland soils. Much of this organic matter is intimately mixed into the soil through biological activity. This increase in organic matter gives the soil a darker color (a higher Munsell color value), greater fertility, and higher moisture holding capacity.

Human activities can also affect soil formation. Tree removal, overgrazing, cultivation, irrigation, draining, road construction, and other developments remove the natural vegetation and may affect the depth of water tables. Irrigation obviously increases the amount of water the site receives directly, while road construction, or any construction that covers or seals the soil surface, will concentrate the amount of water a site receives into a smaller area of infiltration.

Topography can enhance or diminish the effects of climate on soil formation. The most common of these effects are higher precipitation rates and lower air temperatures at higher elevations. Excess water in soils of headwater areas and V-shaped canyons is drained far more rapidly than in soils of flat alluvial terraces, broad-valley positions, glacial depressions, and lacustrine systems. Soils on steep gradients are more susceptible to natural erosion by over-land flow than flatter areas, possibly preventing formation of a deep soil. Landform gradient also tends to produce lateral soil water movement. This water may carry salts, oxides, suspended material, or solutes to landscape depressions. In arid environments, potential evaporation rates exceed precipitation, thereby removing the water and concentrating these salts, often producing saline or alkaline soils.

The length of time parent materials are exposed to weathering directly affects the degree of soil development. Riparian soils are commonly formed in alluvium and are typically younger than adjacent upland soils, but can be of any age. The time required for the development of a soil horizon is uniquely related to all five soil-forming factors.

Hydric Soil Characteristics—Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1990 and Environmental Laboratory 1987). These conditions are generally satisfied in areas that are inundated with water for at least one week during a period when soil temperatures remain above 5° C (41° F) (biological zero). Hydric soils are generally capable of supporting hydrophytic (water-loving) vegetation (Federal Interagency Committee for Wetland Delineation 1989). The National Technical Committee for Hydric Soils developed the following criteria for the purposes of creating a national list of hydric soils from the Map Unit Interpretation Records (MUIR) national database. These criteria were defined from soil properties documented in *Soil Taxonomy* (Soil Survey Staff, 1975) and *Keys to Soil Taxonomy* (Soil Survey Staff 1994). This computer-generated list, maintained and distributed by the Natural Resources Conservation Service (NRCS), is updated annually in October. Criteria 1, 3, and 4 serve as both database criteria and as indicators for identification of hydric soils in the field, while criterion 2 serves only as part of the selection method used to retrieve those soils from the database that meet the defined requirements. State lists of hydric soils are available from the NRCS State Conservationist in each state.

The NRCS also maintains lists of map units that contain or may in some delineations contain hydric soils for each conservation district in the United States. The NRCS recommends using these lists to make jurisdictional wetland determinations (USDA Soil Conservation Service 1990). Caution must be exercised in using the soil survey list for determining the presence of hydric soil at specific sites because upland (non-wetland) soil map units may have inclusions of hydric soil that were not delineated on the map; and conversely. In addition, some map units (alluvial areas, swamp, muck and peat) may be hydric soil areas, but are not on the hydric soils lists because they were not given a series name at the time of mapping. In most cases, a field inspection of the site is required for hydric soil determinations.

Criteria for Hydric Soils:

1. All Histosols except Folists, or
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:
    A. Somewhat poorly drained with a water table equal to 0.0 cm (0.0 ft) from the surface during the growing season, or
    B. Poorly drained or very poorly drained and have either: (1) water table equal to 0.0 cm (0.0 ft) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 50 cm (20 in), or for other soils, (2) water table at less than or equal to 15 cm (0.5 ft) from the surface during the growing season if permeability is equal to or greater than 15 cm/hr (6.0 in/hr) in all layers within 50 cm (20 in), or (3) water table at less than or equal to 30 cm (1.0 ft) from the surface during the growing season if permeability is less than 15 cm/hr (6.0 in/hr) in any layer within 50 cm (20 in), or
3. Soils that are frequently ponded for long duration* or a very long duration** during the growing season, or
4. Soils that are frequently flooded for long duration* or a very long duration** during the growing season.

* Inundation for a single event that ranges from one week to one month.

** Inundation for a single event that is greater than one month.

Soils observed on sampled sites may be classified into five basic orders. These soil orders, along with brief descriptions of each type, are provided in the following table (Table 1). Although soil classification aids in the definition of a particular site type, vegetation associations and communities are often not restricted to one particular soil class. In fact, they may be found on one or more separate orders, and potentially on many more subgroups and great groups within each order, as defined by the soil classification hierarchy established in the *Keys to Soil Taxonomy* (Soil Survey Staff 1994). Rather, the presence and quantity of water are the driving forces in the development of various riparian communities. The examination of soils during the field sampling focused more on the textural classes of the soils, i. e. their water holding or draining capacity, as the most significant feature. The site and soil descriptions for the various habitat types and community types are also oriented more toward soil textures as indicators of soil moisture over soil classification, although soil orders are provided where possible.

Table 1. Soil orders and formative elements of hydric soils

Order	Formative Element	Derivation Description
Alfisols	alf	Pedalfer (Al-Fe) Soil Mineral soils with argillic horizon (clay accumulation); less organic matter, lower base saturation, and lighter colored than Mollisols.
Entisols	ent	Recent Soil. Very young mineral soils; very weak or no horizon development; no deep, wide cracks in most years.
Histosols	ist	Gr.– histos (tissue) Organic soils containing greater than 12-18 percent organic carbon (by weight), depending on percent of mineral materials and clay, to a depth of 40 cm (16 in).
Inceptisols	ept	L.–inceptum (beginning) Mineral soils; minor horizon development with some weatherable minerals; low organic matter content; ash may be abundant; more developed than Entisols.
Mollisols	oll	L.–mollis (soft) Mineral soils; thick, dark surface horizon, high organic matter content; high base saturation.

Soil texture is generally defined as the relative proportion of the different classes of soil particulates (separates) that constitute the soil material (Buol and others 1989). Sand (0.074-2 mm), silt (0.002-0.074 mm) and clay (less than 0.002 mm) comprise the fine earth fraction that make up that portion of the substrate termed soil (Buol and others 1989). Coarser materials, including fine (0.08-0.6 in) and coarse (0.6-2.5 in) gravels, small (2.5-5 in) and large (5-10 in) cobbles, and small (10-20 in) and medium + (greater than 20 in) stones, constitute other size classes common in the near-surface substrate layer, but are not actually considered soil and have not undergone soil pedogenesis.

Within the fine earth fraction, Black (1960) notes that several descriptive classes have been defined according to the various proportions of sand, silt, and clay. Of the dozen or so arbitrary divisions based on size, the term "clay" is used in fully half of these names, representing approximately 80 percent of all of the actual combinations of the three basic soil materials possible. Clay is an essential component in the construct of soil because water maintains a greater affinity for fine-textured particles than coarse-textured ones, especially when the particles are charged, as is often the case with clay. This attraction is more critical in upland areas where water stress is a compelling factor for vegetation development. Riparian zones, by nature, are not limited by soil moisture to the degree of adjacent upland sites. However, late in the season, especially along ephemeral and intermittent watercourses, and at the outside fringe of the riparian zone opposite the channel, water reserves are often limited. Fine particulate soils are capable of retaining greater moisture for longer periods, allowing hydrophytes an opportunity to persist in an otherwise dry environment.

Lentic Ecosystems

Lentic ecosystems are bodies of still water. Water enters lakes from rivers, streams, groundwater, seeps, snowmelt, and precipitation. Water is lost through evaporation, transpiration, seepage, and surface outflow. In Idaho, reservoirs are the most common form of lentic ecosystems.

Water depth, nutrients, pH, and salt concentration largely determine plant and animal species composition of lake communities. Recognizable and consistent vegetative zonation patterns are associated with different water depths. The vegetation, from deep to shallow water depth, typically changes from marsh (emergent vegetation), wet meadow (herbaceous wetland), carr (shrub dominated wetland), to forest. Not all vegetation zones are always present.

Lotic Ecosystems

Lotic ecosystems occur along streams or rivers. Floodplains develop as overbank alluvial depositions accumulate. Most are made up of a series of alluvial terraces at varying levels. Floodplains are the dominant riparian ecosystem in Idaho. Water inputs are from overbank flow (flooding), soil water recharge from channel seepage, and groundwater from adjacent uplands. Flooding supplies nutrients and sediments (clay and silt) to the floodplain. Moving water erodes the outside curves of banks and deposits fresh alluvial materials on the point bars on the inside of curves. During overbank flow new channels may be formed. Overbank flows also deposit alluvium immediately adjacent to stream channels, creating natural levees with the opportunity of either temporary or permanent ponds being formed behind them.

The lateral movements of a river initiate a dynamic series of vegetation events. Vegetation colonizes and stabilizes each new deposit of alluvium. Consequently, each new alluvial bar supports a distinct band of even aged vegetation, typically *Salix* species (willows) and *Populus* species (cottonwoods). As seasons progress and flow decreases, groundwater levels may decrease and lower the amount of water available to vegetation on these deposits. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. If certain portions of the floodplain remain undisturbed for a long enough period, they may develop to a climax community.

Oxbows—Oxbows are meander loops of a stream or river that have been cut off from the main channel. The meander loop is commonly cut off at the "neck" during the time of flood. The ends of the cut-off meander are blocked by bank sediments, and the main channel is now the new straighter course. Floodwater and groundwater (from both channel seepage and from uplands) are the dominant water inputs. Sediments transported by floodwaters are deposited in these areas and slowly fill the depressions. Water chemistry, sedimentation, and water fluctuations are the major factors affecting vegetation. As oxbows fill, the vegetation progresses over time from marsh through wet meadow to shrub- and then tree-dominated communities.

Seep and Spring Ecosystems

Seeps and springs are areas where groundwater is discharged onto the land surface. They are common throughout Idaho and are found on nearly any terrain including mountains, hillsides, and valleys. Seeps and springs are common on toe slopes or elevated terraces at the edge of floodplains, and while these areas may no longer receive floodwaters, they are still able to support wetland communities and generally contain wetland site characteristics. Seeps and springs are also common on mountain hillsides and in mountain valleys where moist meadows often have little or no running water. The abrupt boundary between upland and wetland vegetation often makes these areas readily recognizable. Discharge rates can vary over time depending on groundwater supplies.

DEVELOPMENT OF THE ECOLOGICAL SITE CLASSIFICATION

Background

In 1992, the USDI Bureau of Land Management (BLM) issued the first task order with the Riparian and Wetland Research Program (RWRP), based at the University of Montana's School of Forestry, to conduct riparian surveys on management units within the Upper Snake River District in southern and eastern Idaho. The area included the Medicine Lodge, Big Butte, and Pocatello Resource Areas, formerly of the Idaho Falls District, and the Snake River and Malad Resource Areas, formerly of the Burley District. The 324 km (200 mi) of riparian inventory was designed to define physical and vegetative characteristics of stream reaches for the purpose of assessing functional health of riparian zones. The inventory served as a pilot study for the development of a riparian and wetland ecological site classification system for southern and eastern Idaho. This riparian classification project was initiated in 1994. The classification was modeled after the *Classification and Management of Montana's Riparian and Wetland Sites* created by Hansen and others (1995) for the state of Montana, and closely parallels the methodology and format of that document. Sampling during 1995 and 1996 was done on BLM properties within the former Idaho Falls District in eastern Idaho. *A Preliminary Riparian Habitat Type Classification System for the Bureau of Land Management Districts in Southern and Eastern Idaho* (Hall and Hansen 1997) was published in July of 1997 as a result of this work. In 1998, further sampling was conducted, expanding the coverage of the classification to the west. This area encompassed the former Burley and Shoshone Districts in southern and southcentral Idaho, representing the western portions of the Upper Snake River District.

The collection of data used both in the preliminary draft document and in this classification included sites sampled from Idaho and Montana. Stands from the Montana data set, used in the development of the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995), were collected primarily from the southwest portion of the state. The rational behind the decision to include these sites from Montana was twofold. First, vegetative communities, and the species that compose them, do not comply with political or state boundaries but are dispersed across the landscape according to climate, topography, disturbance regimes and a myriad of other factors. Floristic communities in southwest Montana are similar to those in eastern and southern Idaho, and should not be excluded due to artificial boundaries, such as state lines. Although variations in community composition and structure do occur with shifts in latitude and longitude, significant differences are generally not present within localized regions. Second, time and energy constraints limited the number of sites that could be physically sampled in Idaho. Inclusion of data from other local sources, in this case Montana, helped to ensure that the range and variation of most communities across the landscape were captured.

METHODS

Field Methods

The database used for the development of the Idaho classification contains more than 1,420 sample plots. The following data sets were included in the analysis:

1. Data collected from the Upper Snake River District in Idaho in 1995, 1996, and 1998;
2. Data collected from southwestern Montana for the development of the Montana classification.

The sampling objective was to locate homogeneous stands dominated by riparian and wetland plant species observed to recur across the landscape. Stands persisting in least disturbed states were especially sought to provide the best insight into natural community development. Pfister (1989) indicates that vegetation may be used as an indicator of physical environmental conditions and notes that a variety of factors may influence the physical expression of a site, specifically: flora, fauna, climate, topography, soils, time, and treatments. To use vegetation as a reflection of the landscape, certain factors must be held constant in order to understand the influences of the remaining factors at any particular location. Flora can be controlled by selecting a defined area or region to be studied with specific boundaries and, therefore, a finite range of vegetation communities. Variation in treatment and fauna can be limited by selecting stands that exhibit little disturbance, such as mining or timber practices (treatment) or livestock and extreme wildlife utilization (fauna). Concentration mainly on late seral and climax stands enabled the assumption of relative stability as a control of the time-lapse variable. As a result, the vegetation communities sampled are a product of climate, topography, and edaphic (soil) factors (Pfister 1989).

Although the primary aim was to sample late seral stands, many early to mid-seral stands were sampled to obtain information on the successional pathways of each of the associations encountered. The majority of the landscape does not occur at any given time as climax vegetation, but rather in some earlier seral state, due to regressive disturbances and the natural dynamic inherent to riparian zones. However, many seral stands may be considered "stable" over periods of time pertinent to development of land management strategies. Although not climax communities, many of these longer term seral communities are described in this study as community types. Major examples are the cottonwood tree types.

The method of "subjective sampling without preconceived bias," described by Mueller-Dombois and Ellenberg (1974), was chosen for locating stands. The plots selected reflect the apparent range of environmental and successional conditions and homogeneity of the vegetation rather than the eventual placement of the stand within a classification system.

Sites appearing least disturbed in terms of weed infestation, or evidence of past livestock, mining, timber, and/or recreational use, were preferentially selected for sampling. The optimal period for collecting data in the study extended from mid June to late September, generally considered the greening up period with the highest photosynthetic activity when foliage and reproductive parts are present and individual species can be most readily identified (University of Idaho Climate Data 1996).

Other studies in the northern and central Rocky Mountains have used plots 5 m (16.4 ft) by 10 m (32.8 ft), total area of 50 m^2 (538 ft^2), for sampling a broad range of riparian and wetland communities, including tall shrub types (Mattson 1984, Platts and others 1987, Tuhy and Jensen 1982, Youngblood and others 1985a, Youngblood and others 1985b). For long stringer communities, the plot width was reduced and length was increased to maintain a constant plot size of 50 m^2 (538 ft^2). This plot size was considered adequate to include most species of a community, yet small enough for the sampler to see the entire plot. Each plot was located within a stand at least twice the area of the plot to avoid sampling ecotones between communities. When sampling forest communities, a 375 m^2 (35.8 ft radius) circular plot is used.

Canopy cover (Daubenmire 1959) by species was ocularly estimated within each plot. Age distribution (Myers 1989) and browse utilization of each tree and shrub species was also estimated. Comments on weed infestation, successional trends, adjacent wetland and upland communities, historic disturbance, and anomalies that might not be readily obvious from the field forms, were recorded. Vegetation was usually identified in the field during sampling. In some cases, particular specimens could not be identified in the field. In these instances, samples were collected and pressed for identification back in the office.

Office Methods

Development of the Idaho riparian and wetland site classification followed the stepwise procedure outlined below:

1. Specimens of plants are identified in the field, the office, or The University of Montana herbarium.
2. The stand data is entered into a database for analysis, using modules designed to sort plot data into stand/species tables for use in the stepwise successive approximations to develop the classification (Pfister and Arno 1980).
3. Preliminary association tables are created using plot species and canopy cover values. Stands are then rearranged several times to group them into sets with the greatest vegetation similarities. Plot-to-plot similarity relations, plot-to-set similarity relations, and set-to-set similarity relations were analyzed using a modified Sorensen's Index. The final placement of each sample plot into a set is based on both floristic and environmental relationships.
4. Average canopy cover, canopy cover range, and constancy.tables are created for each group. Average canopy cover is the average value of cover of a species in those plots where it was recorded. Canopy cover range is the lowest and highest canopy cover value recorded for a species. Constancy is the percentage of plots with the species present (sometimes called "presence value"). If constancy is less than 100 percent, then the lower value of the range is zero. To fully understand the distribution and importance of a species in a "type," the reader must

consider both its average canopy cover and constancy together.

5. A dichotomous key to the preliminary types is developed based on the presence or abundance of diagnostic plant species that indicate the presence of certain environmental conditions (indicator species). The key was then applied to all plots, and necessary revisions are made to accommodate variations in the data.
6. A description is prepared for each habitat type and community type, with a general discussion of vegetation, physical site features, and management implications included.
7. The preliminary draft classification for southern and eastern Idaho was provided to users for interim use, field testing, and critical examination in 1997 and 1998.
8. This publication represents a comprehensive document on wetland and riparian habitat types and major seral community types for USDI Bureau of Land Management lands on the Upper Snake River District in southcentral and southeastern Idaho.

A number of riparian habitat types and community types have been defined by various classifications created for the different regions surrounding, and in some cases overlapping portions of, the Idaho study area. These include: *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995), *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper and others 1991), *Riparian Community Type Classification of Utah and Southeastern Idaho* (Padgett and others 1989), *Aspen Community Types of the Intermountain Region* (Mueggler 1988), *Forest Habitat Types of Central Idaho* (Steele and others 1981), *Riparian Community Type Classification of Eastern Idaho-Western Wyoming* (Youngblood and others 1985b) and *Forest Habitat Types of Montana* (Pfister and others 1977). Where possible, previously defined types were adopted for this classification. However, many of the riparian habitat types and community types from other classifications were not equivalent or did not match the types described here. Consequently, only those previously described riparian habitat types and community types that fit the ecological conditions in southcentral and eastern Idaho were adopted in this document. Otherwise, new types were defined here.

A total of 61 types, from approximately 1,420 plots, are described in this classification: 22 tree dominated habitat (10) and community (12) types; 21 willow/shrub dominated habitat (6) and community (15) types; and, 18 sedge and non-sedge dominated habitat (10) and community (8) types (Table 2). Less than one percent of the sampled plots were not classified. These stands were considered transitional stands potentially representing ecotones or were listed as undetermined due to lack of sufficient information for placement in the classification. These isolated stands were designated for further analysis as the classification continues to develop, but were not included in this publication.

Table 2. List of habitat types and community types according to lifeform groups

Lifeform Groups	Habitat Types	Community Types	Total Types
Tree Types			
Coniferous Tree Types	7	1	8
Deciduous Tree Types	3	11	14
Shrub Types			
Willow Shrub Types	6	6	12
Non-willow Shrub Types	0	9	9
Herbaceous Types			
Sedge Herbaceous Types	3	1	4
Non-sedge Herb. Types	7	7	14

Taxonomic Considerations

Plant taxonomy follows the *Vascular Plants of the Pacific Northwest* (Hitchcock and others 1969) and the *Intermountain Flora-Vascular Plants of the Intermountain West, USA* (Cronquist and others 1972). *Field Guide to the Willows of East-Central Idaho* (Brunsfeld and Johnson 1985) was the primary source used for identifying *Salix* (willow) species.

Some species and genera presented problems with identification. Due to frequent absence of inflorescences and to similarities in morphology and ecological amplitude, these taxonomic considerations were made:

1. *Salix geyeriana* (Geyer willow) includes *Salix lemmonii* (Lemmons willow).
2. *Salix lutea* (yellow willow) includes *Salix eriocephala* (diamond willow), *Salix rigida* (diamond willow), and *Salix missouriensis* (Missouri willow) (Great Plains Flora Association 1986).
3. *Picea* species (spruce) includes *Picea engelmannii* (Engelmann spruce) and *Picea glauca* (white spruce).
4. *Polygonum amphibium* (water smartweed) and *Polygonum coccinium* (water smartweed) are now considered conspecific and are both included under the former name.
5. *Agrostis stolonifera* (redtop) and *Agrostis alba* are now considered conspecific and are both included under the former name. Also included is *Agrostis scabra* (tickle-grass).

Ecological Equivalents

Several species are grouped together in the key due to similarities in environmental conditions and management concerns (see Ecological Terms and Concepts). Therefore, stands comprised of the following combinations of species were grouped together:

1. The *Salix geyeriana* (Geyer willow) habitat types include all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow).

2. The *Carex rostrata* (beaked sedge) habitat type includes all combinations of *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), and *Carex atherodes* (awned sedge).
3. The *Carex lasiocarpa* (slender sedge) habitat type includes all combinations of *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge).
4. The *Eleocharis palustris* (common spikesedge) habitat type includes all combinations of *Eleocharis palustris* (common spikesedge) and *Eleocharis acicularis* (needle spike-rush).
5. The *Scirpus acutus* (hardstem bulrush) habitat type includes all combinations of *Scirpus acutus* (hardstem bulrush) and *Scirpus validus* (softstem bulrush).
6. The *Scirpus pungens* (sharp bulrush) habitat type includes all combinations of *Scirpus pungens* (sharp bulrush) and *Scirpus americanus* (American bulrush).
7. The *Typha latifolia* (common cattail) habitat type includes all combinations of *Typha latifolia* (common cattail) and *Typha angustifolia* (narrow-leaved cattail).
8. *Crataegus douglasii* (black hawthorn) community type includes all combinations of *Crataegus douglasii* (black hawthorn) and *Crataegus succulenta* (succulent hawthorn).
9. *Picea* habitat types include all combinations of *Picea engelmannii* (Engelmann spruce) and *Picea glauca* (white spruce).
10. *Rosa woodsii* (woods rose) community type includes all combinations of *Rosa woodsii* (woods rose) and *Rosa acicularis* (prickly rose).
11. The *Agrostis stolonifera* (redtop) community type includes all combinations of *Agrostis stolonifera* (redtop) and *Agrostis exarata* (spike bentgrass).

Ecological Terms and Concepts

Both primary and secondary vegetative succession occur within riparian and wetland environments. Primary succession represents the initial invasion of vegetation on barren sites lacking soil or pedogenic processes. Primary succession may be evident on previously unoccupied bedrock, on recent colluvial or alluvial deposits, or in areas where severe fire or flood has removed surface soil layers. Primary succession usually develops slowly, especially in the early stages as pioneer species gradually colonize and modify infertile sites over time (Clements 1920). However, in riparian zones this process may be much more rapid. Locally adapted pioneer species usually abound ready to establish on alluvial deposits of fine materials with good moisture supply. Secondary succession generally proceeds after disturbances resulting in the loss of the vegetation component, but where the soil layer remains intact. Revegetation may occur rapidly since the growth medium and nutrients remain primarily in situ (Clements 1920). The result of succession in either context is climax vegetation, defined by self-replicating populations of vegetation that, barring disturbance, will persist on a site (Daubenmire 1968).

The following classification of climax vegetation was first proposed by Tansley (1935) and later modified by Daubenmire (1952). A ***climax community*** is a final or steady state plant community which is self-perpetuating and in dynamic equilibrium with its environment. ***Climatic climax*** vegetation develops on normal topography with fairly deep loamy soil. Where topography or soil exert sufficient influence to produce a self-perpetuating, steady state vegetation distinct from the climatic climax, the terms ***topographic climax*** or ***edaphic climax*** are used, respectively. Where special topographic conditions also favor the development of edaphic conditions distinct from the normal, and the climax vegetation is distinct from the climatic climax, the term ***topoedaphic climax*** is used. If recurring disturbances, such as grazing or fire, exert the predominant influence in maintaining the structure and composition of the steady-state vegetation, the term ***disclimax*** is used. A ***zootic climax*** is stable vegetation, which is distinct because of heavy use by animals. ***Fire climax*** is apparently stable vegetation, which is distinctive because of periodic burning. ***Disclimaxes, such as the zootic climax or fire climax, are not the basis for recognizing habitat types.*** Rather, these communities are considered seral for they have not theoretically attained a steady state with their environment.

Daubenmire (1968) defines a stand as an array of vegetation that is predominantly homogeneous in all layers and that is separate from adjacent vegetation arrangements due to differences in qualitative or quantitative characteristics. The assemblage of all climax stands, in which, for all practical purposes, the collective dominant species in each of the apparent layers is similar, is termed a ***plant association.*** No two stands within an association are identical in every facet. All stands bear a high degree of vegetative similarity. Kovalchik (1987) coined the term ***riparian association*** to represent those collections of vegetation in equilibrium with their environment (climax) on sites influenced by specific hydrologic regimes. This classification uses the term riparian association when referring to riparian and wetland climax vegetation.

The following concepts and terminology are consistent with usage proposed by Daubenmire (1952, 1968, 1978) and used in numerous studies of vegetation-based ecological site classification (habitat types) (Daubenmire 1952, Daubenmire and Daubenmire 1968, Daubenmire 1970, Cooper 1975, Hoffman and Alexander 1976, Hoffman and Alexander 1980, Hoffman and Alexander 1983, Hoffman and Alexander 1987, Pfister and others 1977, Moir and Ludwig 1979, Jorgensen 1979, Mueggler and Stewart 1980, Pfister and Arno 1980, Steele and others 1981, Hironaka and others 1983, Hanks and others 1983, Steele and others 1983, Alexander and others

1984a, Alexander and others 1984b, Alexander and others 1986, Cooper 1981, Cooper and Pfister 1985, Hansen and others 1984, Hansen and Hoffman 1988, Hansen and others 1995, Mauk and Henderson 1984, Alexander 1985, Youngblood and Mauk 1985, DeVelice and others 1986, Cooper and others 1991, Kovalchik 1987, Steele and Geier-Hayes 1987, Tiedeman and others 1987, Thompson and Hansen 2001). For a review of vegetation-based ecological site classifications (habitat types), see Ferguson and others (1989) and Pfister (1989).

A ***habitat type*** is defined as the land area that supports, or has the potential of supporting, the same climax vegetation type (association). A ***phase*** is a finer subdivision of a habitat type representing a minor variation in climax vegetation. Each habitat type represents a relatively narrow segment of environmental variation having a certain potential for vegetation development. Although any given habitat type may support a wide variety of disturbance-caused or seral vegetation, the ultimate product of vegetational succession anywhere within that habitat type will be a similar plant community. Therefore, the habitat type is a vegetation-based ecological site classification that uses the plant community as an indicator of integrated environmental factors as they affect species reproduction and plant community development. Changes in site conditions such as drying and filling of potholes or sufficient deposition of alluvium on floodplains to create a drier site over time can change the habitat type. Cyclical changes that do not change long-term site conditions will remain the same habitat type. Habitat types have been used extensively to classify grasslands, shrublands, woodlands, and forests throughout the western United States and to some areas in the central and eastern United States.

The term ***plant association*** is used to group together all those stands of climax vegetation, which occur in environments so similar that there is much floristic similarity throughout all layers of the vegetation. For our work, we have chosen to follow the lead of Kovalchik (1987) in the development of a vegetation based ecological site classification for riparian and wetland areas. Kovalchik (1987) uses the term ***riparian association*** as a vegetation type representing the latest successional stage attainable on a specific hydrologically influenced surface. Because the riparian association is the end result of plant succession, it reflects the most meaningful integration of environmental factors affecting vegetation. (The association, or climax plant community type, is essentially equivalent to "potential natural community [type]," and climax vegetation is essentially equivalent to "potential natural vegetation" for purposes of developing a vegetation-based site classification system.)

Habitat types are named by to their riparian associations. A binomial convention is used, beginning with the dominant overstory species followed, after a slash (/), by the dominant or most diagnostic understory indicator species. Community types are designated similarly, although in many cases, only the name of the dominant overstory species is used. In these cases, no understory species is individually distinctive, usually due to the frequency and/or regularity of disturbance. Both Latin and common names are provided.

In addition to habitat types, several major seral plant communities that are stable for time frames relevant to land management decisions have been described. These are referred to as ***community types.*** A ***community type*** is an aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. Examples are the *Populus deltoides/Cornus stolonifera* (Plains cottonwood/red-osier dogwood) community type and the *Salix exigua* (sandbar willow) community type. ***In this classification, the term community type only represents seral or disclimax communities because climax community types are defined as riparian associations.***

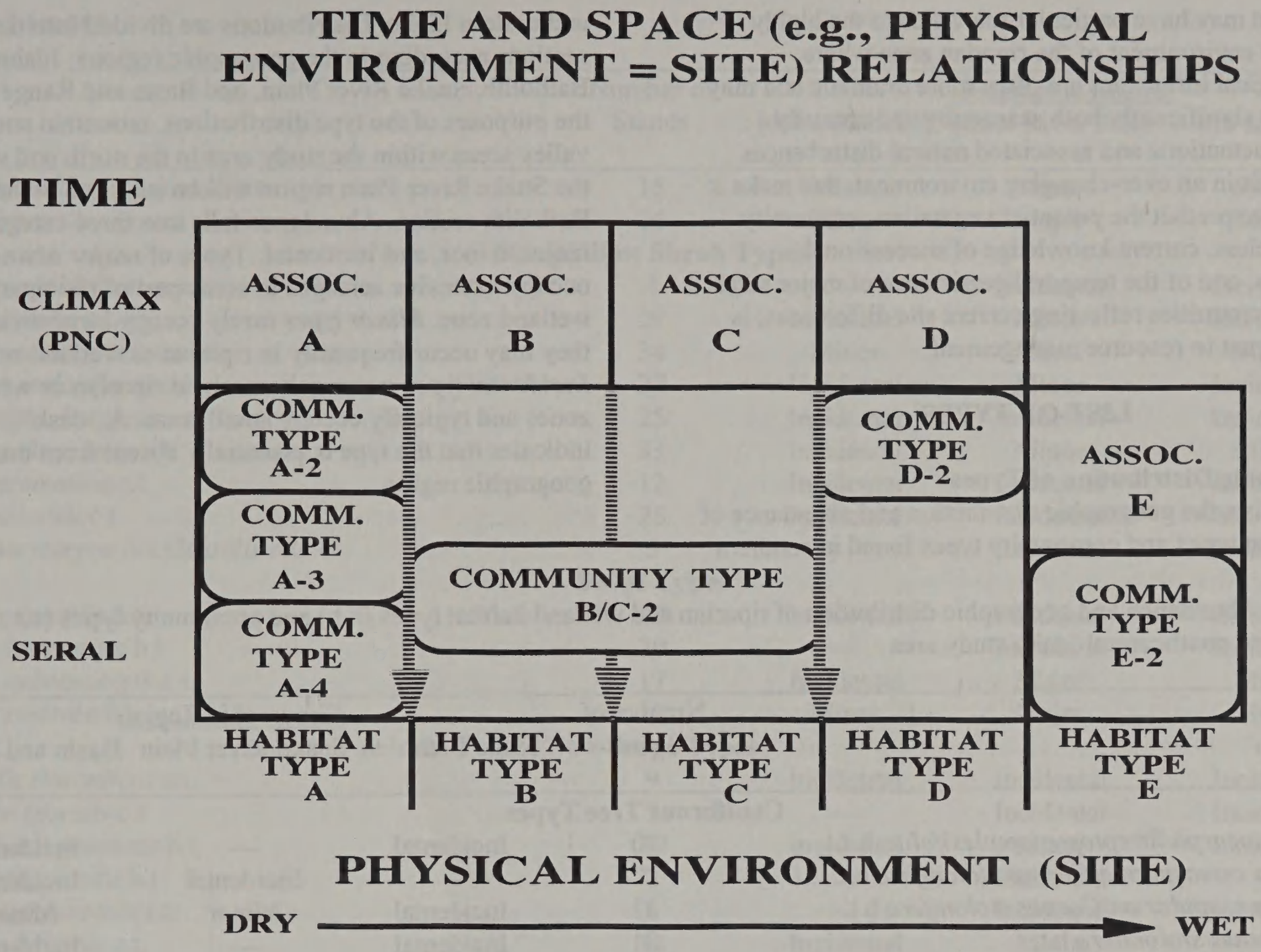

Figure 4. Hierarchical Structure of Habitat Types and Community Type in Relation to Time and Space (Hansen and others, 1995)

Our goal is to provide understanding of plant communities as they relate to factors of time, physical environment (site), and treatment; and to document that understanding through a user-oriented taxonomic classification. The concepts and terminology are illustrated in Figure 4. The upper row of cells is the plant association (climax vegetation type or latest successional stage attainable). After riparian associations are identified and defined, a taxonomic key is written to define the column (physical environment or site) that can be represented by each habitat type. This key allows identification of the habitat type in most stages of successional development. In some instances, the successional relationships are fairly evident. For example, community types A-2, A-3, and A-4 represent specific and clearly identified successional stages within association A.

Again referring to Figure 4, community type B/C-2 may be an early seral natural stage (like *Salix exigua* [sandbar willow]) that may progress toward any of several different late seral or climax communities (like any of the *Populus* [cottonwood] community types, any of the several other *Salix* [willow] habitat types, or one of the several possible tree dominated habitat types). By knowing the local area in which one is working, it is possible to narrow the choice of which later stages are most likely on a site with a generalist community type like *Salix exigua* (sandbar willow). Otherwise, community type B/C-2 may represent a grazing disclimax (like *Crataegus douglasii* (black hawthorn)] community type) that extends over two or more habitat types lacking sufficient evidence to distinguish the habitat type.

For association D, our present knowledge base only allows us to identify one seral stage (D-2) in a progression that likely involves other, yet unidentified stages. Finally, riparian association E represents the short time frame, simple, successional pathway. In this riparian association, seral progression is brief or skipped on the site, and the climax vegetation (riparian plant association) is reached almost immediately or at most after just a few years. Examples include the cases of *Carex rostrata* (beaked sedge) and *Typha latifolia* (common cattail) where the pioneering species is a very aggressive plant that represents the dominant climax vegetation for the site.

Some ecologists dispute the existence of successional end points in the form of climax communities. This argument has developed primarily from the study of global climate change, which indicates that plant communities progress along successional pathways, but are continually adapting to changes in climate and natural disturbance and thus never truly reach an end point in succession. This argument may have particular relevance to the highly dynamic environment of the riparian zone where hydrological influences are often more dramatic and may fluctuate significantly both seasonally and annually. These fluctuations and associated natural disturbances may result in an ever-changing environment, and make it difficult to predict the potential vegetation community. Nevertheless, current knowledge of successional pathways, and of the temporal persistence of major seral plant communities reflecting current site differences, is still relevant to resource management.

LIST OF TYPES

Geographic Distribution of Types

Table 3 lists the geographic distribution and abundance of the habitat types and community types found in southern and eastern Idaho. Distributions are divided into three sections according to the geographic regions: Idaho Batholith, Snake River Plain, and Basin and Range. For the purposes of the type distributions, mountain and valley areas within the study area to the north and west of the Snake River Plain region will be included in the Idaho Batholith section. Abundance falls into three categories; major, minor, and incidental. Types of ***major abundance*** occupy extensive acreages in some part of the riparian or wetland zone. ***Minor types*** rarely occupy large areas, but they may occur frequently in riparian or wetland zones. ***Incidental types*** occur only rarely in riparian or wetland zones and typically occupy small areas. A "dash" indicates that the type is essentially absent from that geographic region.

Table 3. Abundance and geographic distribution of riparian and wetland habitat types (h.t.) and community types (c.t.) in the eastern and southcentral Idaho study area

Type	Number of Stands	Geographic Region		
		Idaho Batholith	Snake River Plain	Basin and Range
Coniferous Tree Types				
Abies lasiocarpa/Streptopus amplexifolius h.t.	10	Incidental	—	Incidental
Juniperus osteosperma/Cornus stolonifera h.t.	3	—	Incidental	Incidental
Juniperus scopulorum/Cornus stolonifera h.t.	22	Incidental	Minor	Minor
Picea/Cornus stolonifera h.t.	31	Incidental	—	Incidental
Picea/Equisetum arvense h.t.	14	Incidental	—	Incidental
Picea/Galium triflorum h.t.	14	Incidental	—	Incidental
Pinus flexilis c.t.	2	Incidental	—	Incidental
Pseudotsuga menziesii/Cornus stolonifera h.t.	15	Minor	Minor	Minor
Deciduous Tree Types				
Acer negundo/Cornus stolonifera h.t.	21	—	Minor	Incidental
*Elaeagnus angusti*folia c.t.	9	Incidental	Minor	Minor
Populus angustifolia/Cornus stolonifera c.t.	24	Incidental	Major	Minor
*Populus angustifolia/*Herbaceous c.t.	30	Incidental	Minor	Minor
*Populus angustifolia/*Recent Alluvial Bar c.t.	8	Incidental	Incidental	Incidental
Populus angustifolia/Symphoricarpos occidentalis c.t.	16	Incidental	Minor	Minor
Populus tremuloides/Cornus stolonifera h.t.	35	Incidental	Incidental	Minor
*Populus tremuloides/*Herbaceous c.t.	25	Incidental	Incidental	Minor
Populus tremuloides/Osmorhiza occidentalis h.t.	6	Incidental	—	Incidental
Populus trichocarpa/Cornus stolonifera c.t.	27	Incidental	Minor	Incidental
*Populus trichocarpa/*Herbaceous c.t.	12	Incidental	Minor	Minor
*Populus trichocarpa/*Recent Alluvial Bar c.t.	17	Incidental	Incidental	Incidental
Populus trichocarpa/Symphoricarpos occidentalis c.t.	21	Incidental	Minor	Incidental
Salix amygdaloides c.t.	24	Incidental	Incidental	Incidental
Willow Shrub Types				
Salix bebbiana c.t.	21	Minor	Incidental	Incidental
Salix drummondiana/Calamagrostis canadensis h.t.	15	Incidental	Incidental	—
Salix drummondiana/Carex rostrata h.t.	30	Incidental	Incidental	—
Salix drummondiana c.t.	2	Incidental	Incidental	Incidental
Salix exigua c.t.	44	Major	Major	Major
Salix geyeriana/Calamagrostis canadensis h.t.	29	Incidental	Incidental	Incidental
Salix geyeriana/Carex rostrata h.t.	70	Incidental	Minor	Minor
Salix geyeriana c.t.	58	Minor	Major	Minor
Salix lasiandra c.t.	21	Minor	Minor	Minor
Salix lutea/Calamagrostis canadensis h.t.	5	Incidental	Incidental	Incidental

Table 3 (cont.)

Type	Number of Stands	Geographic Region Idaho Batholith	 Snake River Plain	 Basin and Range
Salix lutea/Carex rostrata h.t.	15	Minor	Minor	Minor
Salix lutea c.t.	26	Minor	Major	Major
Non-Willow Shrub Types				
Acer grandidentatum c.t.	4	—	Incidental	Incidental
Alnus incana c.t.	29	Incidental	Minor	Incidental
Betula occidentalis c.t.	34	Minor	Minor	Minor
Cornus stolonifera c.t.	27	Incidental	Minor	Incidental
Crataegus douglasii c.t.	25	Incidental	Incidental	Incidental
Prunus virginiana c.t.	33	Incidental	Minor	Minor
Rhus aromatica c.t.	12	Incidental	Incidental	Incidental
Rosa woodsii c.t.	26	Incidental	Incidental	Incidental
Symphoricarpos occidentalis c.t.	5	—	Incidental	Incidental
Sedge Types				
Carex aquatilis h.t.	42	Incidental	Incidental	Incidental
Carex lasiocarpa h.t.	20	—	Incidental	Incidental
Carex nebrascensis c.t.	17	Incidental	Minor	Minor
Carex rostrata h.t.	12	Minor	Major	Minor
Non-Sedge Types				
Agrostis stolonifera c.t.	9	Incidental	Incidental	Incidental
Bromus inermis c.t	5	—	Incidental	Incidental
Eleocharis palustris h.t.	29	Incidental	Minor	Incidental
Glyceria grandis h.t.	2	—	Incidental	—
Hordeum jubatum c.t.	6	—	Incidental	Incidental
Juncus balticus c.t.	14	Incidental	Minor	Incidental
Phalaris arundinacea h.t.	12	Minor	Major	Minor
Phragmites australis h.t.	10	—	Incidental	Incidental
Poa pratensis c.t.	10	Incidental	Minor	Minor
Polygonum amphibium c.t.	10	Incidental	Incidental	Incidental
Scirpus acutus h.t.	29	Minor	Major	Major
Scirpus pungens h.t.	16	—	Incidental	Incidental
Typha latifolia h.t.	18	Minor	Major	Minor
Xanthium strumarium c.t.	3	—	Incidental	Incidental

USE OF THE CLASSIFICATION

Management Interpretations

Habitat type classifications provide a relatively permanent and ecologically-based system of land stratification in terms of vegetational potential (Daubenmire 1976). The habitat type is the basic unit in classifying land units or sites based on biotic potential, it emphasizes similarities in ecosystems which carry implications for a variety of land management objectives (Daubenmire 1984). Some of the practical implications of habitat type classification are in predicting livestock and wildlife forage production and wildlife habitat values, inventory, landtype mapping, timber production, species selection for regeneration and/or rehabilitation, development of best management practices, growth rates of trees and shrubs, susceptibility of trees and shrubs to insects and disease, depth of soil moisture penetration, potential for producing browse after fire, soil management criteria, impacts of recreational uses, natural areas for preservation, downed woody fuels on the forest floor, and successional trends following disturbance. In addition, habitat types offer a basis of comparison and evaluation useful in designing and carrying out field experiments in ecology or applied natural resource disciplines.

There are typically three misconceptions about the use of habitat type classification: 1) the expectation of an abundance of climax vegetation to be present on the current landscape, 2) that natural resource managers need to manage solely for climax vegetation, and 3) that use of a habitat type classification requires climax or near-climax vegetation. For the first two misconceptions, the opposite is true. A very high percentage of our landscape has experienced disturbance resulting in domination by various seral stages. In the second case, preferred management strategies quite often favor seral, instead of climax potential species, regardless of habitat type. In the third misconception, comparing the relative reproductive success of certain plant species present, having known successional process, generally permits identification of the habitat type. In general, succession is more rapid for undergrowth species, providing insight into the habitat type for the site. Where stands have been severely disturbed, are in an early seral stage, or have a closed canopy resulting in a depauperate understory, comparison of the stand with nearby stands on physically similar sites can assist in habitat type identification.

Habitat type classifications are useful to land and resource managers in that: 1) they provide a permanent and ecologically based system of site classification that is referenced to vegetation potential (Daubenmire 1976), 2) they provide a vegetational classification for near-climax to climax communities, 3) they provide a system in which successional stages can be identified and described, thereby increasing our knowledge and ability to predict changes on the landscape, and 4) they provide a basis for making predictions about various management decisions or expected trends resulting from natural disturbances on similar units of land.

Successional Relationships

The process of change by which biotic communities replace each other, and by which the physical environment becomes altered over time is referred to as succession (Kimmins 1987). As discussed earlier in the Ecological Terms and Concepts Section, two types of succession characterize vegetation development: 1) primary succession, and 2) secondary succession. Development of vegetation on newly created soil surfaces, such as filling in a lake or a newly formed alluvial bar, is primary succession. This slow process may require many centuries to reach a stable or climax community. Secondary succession occurs after disturbance, such as a fire, alters or destroys the vegetation cover, but not the soil. Revegetation usually happens quickly. Extreme disturbance (such as soil erosion or fire consumption of organics in the substrate) may alter the site so drastically that succession becomes primary.

Secondary succession may proceed in either of two directions: toward or away from the climax community or potential natural community (PNC). For example, the establishment of *Acer negundo* (box-elder) seedlings under an overstory of cottonwoods would represent progressive succession toward the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type. The failure of *Acer negundo* (box-elder) to establish itself and the resulting domination of the understory by *Poa pratensis* (Kentucky bluegrass) due to overgrazing would represent regressive succession away from potential climax. Plant communities that represent steps along the successional pathways toward or away from the potential climax association are called seral stages or seral communities. Major, relatively stable, seral or disclimax plant communities are formally defined as community types in this publication. Descriptions of seral stages and successional pathways are included in the habitat type descriptions.

In upland sites, ecologists and land managers have typically only had to deal with secondary succession. However, in many riparian and wetland situations, primary succession is just as important in explaining vegetational development. One of the most important characteristics of riparian and wetland areas is their dynamic nature. Not only does vegetation change with time and disturbance within a habitat type, but the site itself may also be altered by changes in the hydrology or soil. Alluvial depositions can alter the available water on a floodplain site. Rapid accumulations of organic materials can occur on fens, bogs, and wet meadows, altering water holding capacity and nutrient availability of the soil. Site potential may change when the water table is lowered by draining or heavy livestock impacts. Permanent flooding by human (dams) or wildlife activity (beavers) will also change site potential. Any site that has changed significantly will undergo change in potential climax community (and habitat type).

Developing Reasonable and Attainable Management Goals and Objectives

After riparian and wetland habitat types and community types have been identified on a site, there are several uses for the information. Understanding of the information available in this document will increase over time with use. Some examples of the uses of the information are discussed here.

Land managers sometimes wish to achieve certain vegetation communities in riparian and wetland areas. With the information provided in this document, a good understanding of what is feasible for a site can be determined. For example, on a degraded site with only a scattering of *Salix geyeriana* (Geyer willow), the expected canopy cover can be determined from the canopy cover tables in the text. From this information, objectives can be formulated (i. e., to increase the canopy cover of *Salix geyeriana* (Geyer willow) from 2 percent to 50 percent on a particular stream reach within 12 years). Appropriate species for site rehabilitation can also be determined. For example, on a placer mining site, there may be no vegetation remaining in the riparian or wetland area. The type descriptions provide lists of species that typically occur on the site for an identified type.

OVERVIEW

No two vegetation communities are exactly alike due to differences in climate, parent material, topography, elevation, disturbance regimes and a host of other variables. The ecological site classification concept used in this study is based on the premise that vegetation on a site reflects the culmination of all the elements at work there. Those species present on site best reflect the principal forces acting there.

This approach results in a classification that establishes baseline information for riparian and wetland zones in southcentral and southeastern Idaho. It provides land managers with information enabling them to develop appropriate management strategies and policies. Two features of this classification that increase its utility for land managers are the dichotomous key and the successional hierarchy established in the habitat type framework. The dichotomous key offers a simple approach to identifying vegetation types. Users, with some knowledge of the local flora, need only to identify the dominant overstory and understory species, and some indicator species, to use the classification. Type descriptions provide species lists, summarize physical parameters, outline successional trends, and present viable management strategies.

Another useful feature of the classification is the successional framework inherent within the habitat type concept. A habitat type represents the land area that supports, or has the potential to support, the same climax vegetation wherever it occurs (Daubenmire 1968). The climax vegetation, or riparian association, represents the endpoint of succession on a site. Community types (intermediate, seral plant communities with similar floristic components in all structural layers) represent intermediate stages of succession. They can be organized within the framework of a habitat type system to form successional paths useful in predicting the pattern of community replacement from the pioneer to climax stages. Projection of potential, future vegetation communities in an area provides land managers with a tool for developing strategies and realistic goals.

KEY TO RIPARIAN AND WETLAND SITES OF USDI BUREAU OF LAND MANAGEMENT LANDS IN EASTERN AND SOUTHERN IDAHO

BACKGROUND

1. The study area encompasses the former Idaho Falls, Shoshone and Burley BLM Districts, now within the Upper Snake River BLM District, in southeastern and southcentral Idaho (Fig. 1 and 2). It is bounded by the Continental Divide at the Montana/Idaho border to the north, and the Wyoming/Idaho border along the Teton, Snake River, and Salt River Mountain Ranges to the east. To the south, it is delineated by the Utah/Idaho and Nevada/Idaho borders which run along an east/west axis bisecting a series of parallel, block-faulting mountain ranges aligned north/south. The western boundary, just west of Twin Falls, runs north from the Nevada border near Idavada. It overlaps the Salmon Falls Creek Canyon to its intersection with the Snake River Canyon, then continues northwest along the Snake River Canyon to an area just to the west of King Hill. The boundary angles north, following the Elmore/Camas County line, and turns east at the northeast corner of Elmore County, where it parallels the southern boundary of Custer County, progressing southeast toward the Craters of the Moon National Monument. It then bends northeast, along the Custer and Lemhi County lines where it converges with the Continental Divide approximately 40 km (25 mi) west of Monida Pass on the Idaho/Montana border.

2. The key identifies first the tree, then shrub, and finally herbaceous types. Within each of these categories, the habitat types are identified first followed by community types. The key generally identifies wetter habitat types and community types first.

3. The key attempts to identify site potential. If that is not possible due to disturbance, both natural (e.g., recently deposited alluvial bars) and/or human-caused (e.g., livestock, logging), the key will then drop into a community type. ***Reminder: This publication describes several major seral plant communities (community types) that are stable for time frames important for making management decisions.*** The possible potential(s) for a site are discussed in the Successional Information section of each community type.

4. For classifying severely degraded sites, the user should seek similar positions on the landscape that are less disturbed for clues to what could be there. Then read the type description before finalizing a determination.

5. Most of the conifer stands sampled were successionally late seral to climax, while all other types (deciduous trees, willows, non-willows shrubs, sedges, and herbaceous non-sedges) were sampled in stages from early seral to climax.

INSTRUCTIONS

1. Accurately identify and record the canopy cover for all indicator species. The indicator species are those species used in the key.

2. The plot being classified must be representative of the stand as a whole. If not, take another plot. Environmental and vegetation uniformity must be a primary consideration in plot selection.

3. Identify the potential lifeform using the ***Lifeform Group Key.*** Generally a tree species is considered successfully reproducing if 10 or more individuals per acre (25/ha) occupy ***or will occupy the*** site.

4. Within the correct lifeform group, follow the key literally to the ***Habitat Type or Community Type*** of the site in question. ***All*** conditions stipulated for each couplet must be satisfied in order to make a correct determination. The first set of conditions to satisfy the key should provide the correct classification.

5. On sites where the vegetation is obviously depauperate (unusually sparse) because of heavy grazing or browsing pressure, dense shading, or duff accumulations, ***adjust the key downward*** to reflect the reduced canopy cover. For example, when the key calls for a species with at least 5 percent canopy cover, that amount would be reduced to only 1 percent canopy cover. Extrapolation from the nearest non-depauperate, similar, site will aid in the correct determination of type.

   When classifying a site, look for and avoid ***microsites. Microsites*** are small areas that are atypical of the stand as a whole. Examples include windthrow pockets filled with colluvium/alluvium or raised hummocks of willows growing on abandoned beaver dams.

6. In sites that are heavily impacted by grazing or browsing pressures, look around for *ANY* shrub or tree remnants (stumps). In extreme situations, the potential natural vegetation may be present only as dwarf-looking, widely scattered individuals. If this is the case, again adjust the key downward to reflect the reduced canopy cover. Once again, extrapolation from the nearest non-grazed or non-browsed stand occurring on a comparable site will assist in correct determination of type.

7. Habitat type or community type can generally be projected for a site in early seral stage by examining nearby site(s) having the same site conditions (soils, hydrologic characteristics, landscape position, etc.).

8. ***Caution!*** Potential of a site may change if there is change in the soil and/or hydrologic regime of the site.

9. ***Warning! The key is not the classification! Validate your determination by comparing the site characteristics with the written description of the type. Be aware that environmental conditions described in the text are from both sampled sites and personal observations and may not include all the sites on the landscape in which the type is found.***

KEY TO LIFEFORM GROUPS

1. Coniferous trees present ***AND*** successfully reproducing (10 or more trees per acre) ***AND NOT*** restricted to microsites. .... **Coniferous Tree Types (p. 25)**

1. Coniferous trees absent ***OR*** if present, not successfully reproducing ***OR*** are restricted to microsites. **2**

   2. *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) present ***AND*** successfully reproducing (10 or more trees per acre) ***AND NOT*** restricted to microsites. .... **Deciduous Tree Types (p. 27)**

   2. *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) absent ***OR*** if present, not successfully reproducing ***OR*** are restricted to microsites. **3**

3. Deciduous tree species other than *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) present with a combined canopy cover of at least 25 percent. .... **Deciduous Tree Types (p. 27)**

3. Deciduous trees absent ***OR*** if present, with a combined canopy cover of less than 25 percent. **4**

   4. Shrubs present with a combined canopy cover of at least 10 percent. .... **Shrub Types (p. 29)**

   4. Shrubs with a combined canopy cover of less than 10 percent; herbaceous species present with a combined canopy cover of at least 15 percent, or emergent herbaceous species with at least 5 percent canopy cover. .... **Herbaceous Types (p. 32)**

KEY TO CONIFEROUS TREE TYPES

Coniferous trees present ***AND*** successfully reproducing (10 or more trees per acre) ***AND NOT*** restricted to microsites.

1. *Abies lasiocarpa* (subalpine fir) present and reproducing successfully. **2**

1. *Abies lasiocarpa* (subalpine fir) absent or, if present, ***NOT*** reproducing successfully. **3**

   2. *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Senecio triangularis* (arrowleaf groundsel), *Mitella breweri* (Brewer's mitrewort), *M. pentandra* (five-stamened mitrewort), or *Gymnocarpium dryopteris* (oak-fern), individually or in combination, with at least 1 percent canopy cover. ....***Abies lasiocarpa/Streptopus amplexifolius*** ....**(subalpine fir/clasping-leaved twisted stalk) Habitat Type (p. 36)**

   2. *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Senecio triangularis* (arrowleaf groundsel), *Mitella breweri* (Brewer's mitrewort), *M. pentandra* (five-stamened mitrewort), or *Gymnocarpium dryopteris* (oak-fern), individually or in combination, with less than 1 percent canopy cover. **15**

3. *Picea engelmannii* (Engelmann spruce) or *P. glauca* (white spruce) present and reproducing successfully. **4**

3. *Picea engelmannii* (Engelmann spruce) or *P. glauca* (white spruce) absent, or if present, not reproducing successfully. **7**

    4. *Equisetum arvense* (field horsetails) with at least 25 percent canopy cover... ....***Picea/Equisetum arvense* (spruce/field horsetail) Habitat Type (p. 54)**

    4. *Equisetum arvense* (field horsetails) with less than 25 percent canopy cover. **5**

5. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or *Salix* species (willows) present. .... ***Picea/Cornus stolonifera* (spruce/red-osier dogwood) Habitat Type (p. 47)**

5. *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or *Salix* species (willows) absent. **6**

    6. Site ***WITH*** at least ***TWO*** of the following moist site forbs present: *Galium triflorum* (sweetscented bedstraw), *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Osmorhiza occidentalis* (western sweet-cicely), or *Actaea rubra* (baneberry). ....***Picea/Galium triflorum* (spruce/sweetscented bedstraw) Habitat Type (p. 58)**

    6. Site ***WITHOUT*** at least ***TWO*** of the following moist site forbs present: *Galium triflorum* (sweetscented bedstraw), *Streptopus amplexifolius* (clasping-leaved twisted stalk), *Osmorhiza occidentalis* (western sweet-cicely), or *Actaea rubra* (baneberry).. **15**

7. *Pseudotsuga menziesii* (Douglas fir) present and reproducing successfully. **8**

7. *Pseudotsuga menziesii* (Douglas fir) absent or not reproducing successfully.. **9**

    8. *Cornus stolonifera* (red-osier dogwood), willows (except *Salix scouleriana* [Scouler willow]), *Equisetum arvense* (field horsetails), *Prunus virginiana* (common chokecherry), or *Acer glabrum* (Rocky Mountain maple), individually or in combination, with at least 1 percent canopy cover. ....***Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) Habitat Type (p. 66)**

    8. *Cornus stolonifera* (red-osier dogwood), willows (except *Salix scouleriana* [Scouler willow]), *Equisetum arvense* (field horsetails), *Prunus virginiana* (common chokecherry), or *Acer glabrum* (Rocky Mountain maple), individually or in combination, with at least 1 percent canopy cover. **15**

9. *Pinus flexilis* (limber pine) present and reproducing successfully.. **10**

9. *Pinus flexilis* (limber pine) absent, or if present, not reproducing successfully. **11**

    10. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), or *Poa pratensis* (Kentucky bluegrass), individually or in combination, with at least 1 percent canopy cover.. .... ***Pinus Flexilis* (limber pine) Community Type (p. 63)**

    10. *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), or *Poa pratensis* (Kentucky bluegrass), individually or in combination, with at least 1 percent canopy cover... **15**

11. *Juniperus scopulorum* (Rocky Mountain juniper) present and reproducing successfully. *Populus tremuloides* (quaking aspen) and *Acer negundo* (box-elder) absent, or if present, not reproducing successfully. **12**

11. *Juniperus scopulorum* (Rocky Mountain juniper) absent, or if present, not reproducing successfully, ***OR*** *Populus tremuloides* (quaking aspen) or *Acer negundo* (box-elder) present and reproducing successfully. **13**

    12. *Populus* species (cottonwoods) with at least 5 percent canopy cover ***OR*** *Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), or *Agrostis stolonifera* (redtop), individually or in combination, with at least 1 percent canopy cover...***Juniperus scopulorum/Cornus stolonifera*** .... **(Rocky Mountain juniper/red-osier dogwood) Habitat Type (p. 43)**

12. *Populus* species (cottonwoods) with less than 5 percent canopy cover ***AND*** *Cornus stolonifera* (red-osier dogwood), *Poa pratensis* (Kentucky bluegrass), or *Agrostis stolonifera* (redtop), individually or in combination, with less than 1 percent canopy cover.. **15**

13. *Juniperus osteosperma* (Utah juniper) present and reproducing successfully. *Populus tremuloides* (quaking aspen) and *Acer negundo* (box-elder) absent, or if present, not reproducing successfully.. **14**

13. *Juniperus osteosperma* (Utah juniper) absent, or if present, not reproducing successfully, ***OR*** *Populus tremuloides* (quaking aspen) or *Acer negundo* (box-elder) present and reproducing successfully... .... **GO TO THE DECIDUOUS TREE KEY (p. 27)**

14. *Cornus stolonifera* (red-osier dogwood), *Rhus aromatica* (fragrant sumac), willows (except *Salix scouleriana* [Scouler willow]), or *Poa pratensis* (Kentucky bluegrass), individually or in combination, with at least 1 percent canopy cover..***Juniperus osteosperma/Cornus stolonifera*** ....**(Utah juniper/red-osier dogwood) Habitat Type (p. 41)**

14. *Cornus stolonifera* (red-osier dogwood), *Rhus aromatica* (fragrant sumac), willows (except *Salix scouleriana* [Scouler willow]), or *Poa pratensis* (Kentucky bluegrass) individually or in combination, with less than 1 percent canopy cover.. **15**

15. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology...**Unclassified Riparian or Wetland Site**

In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

15. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Upland Site**

Refer to following publications for possible fit: Steele and others 1981, Youngblood and others 1985b, Mueggler 1988, Padgett and others 1989, Cooper and others 1991, and Hansen and others 1995.

KEY TO DECIDUOUS TREE TYPES

Acer negundo (box-elder) or *Populus tremuloides* (quaking aspen) present ***AND*** successfully reproducing (10 or more trees per acre) ***AND NOT*** restricted to microsites ***OR*** deciduous tree species other than *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) present with a combined canopy cover of at least 25 percent.

1. *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) present and reproducing successfully..................... **2**

1. *Acer negundo* (box-elder) or *Populus tremuloides* (quaking aspen) absent, or if present, not reproducing successfully. . **5**

2. *Acer negundo* (box-elder) with at least 5 percent canopy cover. ....***Acer negundo/Cornus stolonifera*****(box-elder/red-osier dogwood) Habitat Type (p. 72)**

2. *Acer negundo* (box-elder) with less than 5 percent canopy cover; *Populus tremuloides* (quaking aspen) with at least 5 percent canopy cover... **3**

3. *Salix* species (willows), *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or *Prunus virginiana* (common chokecherry), individually or in combination, with at least 5 percent canopy cover... ....***Populus tremuloides/Cornus stolonifera*** ....**(quaking aspen/red-osier dogwood) Habitat Type (p. 95)**

3. *Salix* species (willows), *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), or *Prunus virginiana* (common chokecherry), individually or in combination, with less than 5 percent canopy cover. **4**

4. Site *WITH* at least *ONE* of the following species present: *Osmorhiza occidentalis* (western sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Heracleum lanatum* (cow-parsnip), or *Actaea rubra* (baneberry). ....
.......***Populus tremuloides/Osmorhiza occidentalis*** **(quaking aspen/western sweet-cicely) Habitat Type (p. 106)**

4. Site *WITHOUT* at least *ONE* of the following species present: *Osmorhiza occidentalis* (western sweet-cicely), *Galium triflorum* (sweetscented bedstraw), *Heracleum lanatum* (cow-parsnip), or *Actaea rubra* (baneberry).........
..............................***Populus tremuloides*/Herbaceous (quaking aspen/herbaceous) Community Type (p. 102)**

5. *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood) with a greater canopy cover than other individual tree species. 6

5. Other individual tree species with a greater canopy cover than *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood). **13**

6. *Populus trichocarpa* (black cottonwood) with a greater canopy cover than Populus *angustifolia* (narrowleaf cottonwood). 7

6. *Populus angustifolia* (narrowleaf cottonwood) with a greater canopy cover than Populus *trichocarpa* (black cottonwood). **10**

7. Seedling or sapling age classes (dbh < 13 cm [5.0 inches]) of *Populus trichocarpa* (black cottonwood) dominate the site; site is a recently deposited alluvial bar.. ***Populus trichocarpa*/Recent Alluvial Bar**
.... **(black cottonwood/recent alluvial bar) Community Type (p. 118)**

7. Pole or mature age classes (dbh < 13 cm [5.0 inches]) of *Populus trichocarpa* (black cottonwood) dominate the site. ... 8

8. Shrub species with at least 25 percent canopy cover. 9

8. Shrub species with less than 25 percent canopy cover. ....
.........................***Populus trichocarpa*/Herbaceous (black cottonwood/herbaceous) Community Type (p. 113)**

9. *Cornus stolonifera* (red-osier dogwood) with at least 1 percent canopy cover. ....
.............***Populus trichocarpa/Cornus stolonifera*** **(black cottonwood/red-osier dogwood) Community Type (p. 109)**

9. *Cornus stolonifera* (red-osier dogwood) with less than 1 percent canopy cover...
....***Populus trichocarpa/Symphoricarpos occidentalis***
.... **(black cottonwood/western snowberry) Community Type (p. 123)**

10. Seedling or sapling age classes (dbh < 13 cm [5.0 inches]) of *Populus angustifolia* (narrowleaf cottonwood) dominate the site; site is a recently deposited alluvial bar. ....***Populus angustifolia*/Recent Alluvial Bar**
.... **(narrowleaf cottonwood/recent alluvial bar) Community Type (p. 87)**

10. Pole or mature age classes (dbh < 13 cm [5.0 inches]) of *Populus angustifolia* (narrowleaf cottonwood) dominate the site. **11**

11. Shrub species with at least 25 percent canopy cover. **12**

11. Shrub species with less than 25 percent canopy cover. ....***Populus angustifolia*/Herbaceous**
....**(narrowleaf cottonwood/herbaceous) Community Type (p. 83)**

12. *Cornus stolonifera* (red-osier dogwood) with at least 1 percent canopy cover..
.... ***Populus angustifolia/Cornus stolonifera***
....**(narrowleaf cottonwood/red-osier dogwood) Community Type (p. 77)**

12. *Cornus stolonifera* (red-osier dogwood) with less than 1 percent canopy cover. ....
....***Populus angustifolia/Symphoricarpos occidentalis***
....**(narrowleaf cottonwood/western snowberry) Community Type (p. 90)**

13. *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive) with a greater canopy cover than other individual tree species.. **14**

13. Other individual tree species with a greater canopy cover than *Salix amygdaloides* (peach-leaf willow) or *Elaeagnus angustifolia* (Russian olive). **15**

    13. *Salix amygdaloides* (peach-leaf willow) with a greater canopy cover than *Elaeagnus angustifolia* (Russian olive). . ... ***Salix amygdaloides* (peach-leaf willow) Community Type (p. 128)**

    14. *Elaeagnus angustifolia* (Russian olive) with a greater canopy cover than *Salix amygdaloides* (peach-leaf willow). . ...***Elaeagnus angustifolia* (Russian olive) Community Type (p. 74)**

15. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Unclassified Riparian or Wetland Site**

In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

15. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Upland Site**

    Refer to the following for possible fit: Youngblood and others 1985b, Mueggler 1988, Padgett and others 1989, and Hansen and others 1995.

KEY TO SHRUB TYPES

Shrubs present with a combined canopy cover of at least 10 percent.

1. *Salix* species (willows) with at least 10 percent canopy cover. .... **Willow Shrub Key (p. 29)**

1. *Salix* species (willows) with less than 10 percent canopy cover.. **Non-Willow Key (p. 31)**

KEY TO WILLOW SHRUB TYPES

1. *Salix geyeriana* (Geyer willow), *S. boothii* (Booth willow), *S. drummondiana* (Drummond willow), or *S. lutea* (yellow willow), individually or in combination, with at least 10 percent canopy cover. **2**

1. *Salix geyeriana* (Geyer willow), *S. boothii* (Booth willow), *S. drummondiana* (Drummond willow), or *S. lutea* (yellow willow), individually or in combination, with less than 10 percent canopy cover. **10**

    2. *Salix lutea* (yellow willow) with a greater canopy cover than *S. drummondiana* (Drummond willow) ***OR*** the combined canopy cover of *S. geyeriana* (Geyer willow) and *S. boothii* (Booth willow). **3**

    2. *Salix drummondiana* (Drummond willow) ***OR*** the combined canopy cover of *S. geyeriana* (Geyer willow) and *S. boothii* (Booth willow) with a greater canopy cover than *S. lutea* (yellow willow)... **5**

3. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with at least 10 percent canopy cover. ....***Salix lutea/Carex rostrata* (yellow willow/beaked sedge) Habitat Type (p. 172)**

3. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with less than 10 percent canopy cover. **4**

    4. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with at least 5 percent canopy cover. .... ***Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) Habitat Type (p. 169)**

4. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with less than 5 percent canopy cover. .... ***Salix lutea*** **(yellow willow) Community Type (p. 176)**

5. *Salix geyeriana* (Geyer willow) or *S. boothii* (Booth willow), individually or in combination, with a greater canopy cover than *Salix drummondiana* (Drummond willow). **8**

5. *Salix drummondiana* (Drummond willow) with a greater canopy cover than the combined canopy cover of *S. geyeriana* (Geyer willow) and *S. boothii* (Booth willow). **6**

6. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with at least 10 percent canopy cover. .... ***Salix drummondiana/Carex rostrata*** **(Drummond willow/beaked sedge) Habitat Type (p. 138)**

6. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with less than 10 percent canopy cover. **7**

7. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with at least 5 percent canopy cover. ....***Salix drummondiana/Calamagrostis canadensis*** **(Drummond willow/bluejoint reedgrass) Habitat Type (p. 134)**

7. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with less than 5 percent canopy cover. .... ***Salix drummondiana*** **(Drummond willow) Community Type (p. 144)**

8. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with at least 10 percent canopy cover. .... ***Salix geyeriana/Carex rostrata*** **(Geyer willow/beaked sedge) Habitat Type (p. 155)**

8. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), *C. atherodes* (awned sedge), or *C. aquatilis* (water sedge), individually or in combination, with less than 10 percent canopy cover. **9**

9. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with at least 5 percent canopy cover. .... ***Salix geyeriana/Calamagrostis canadensis*** **(Geyer willow/bluejoint reedgrass) Habitat Type (p. 149)**

9. *Calamagrostis canadensis* (bluejoint reedgrass), *C. stricta* (narrow-spiked reedgrass), or *Deschampsia cespitosa* (tufted hairgrass), individually or in combination, with less than 5 percent canopy cover. .... ***Salix geyeriana*** **(Geyer willow) Community Type (p. 162)**

10. ***Individual non-willow species*** with a greater canopy cover than any ***individual willow species.*** .... **GO TO THE NON-WILLOW KEY (p. 31)**

10. ***Individual willow species*** with a greater canopy cover than any ***individual non-willow species.*** **11**

11. *Salix lasiandra* (Pacific willow) with a greater canopy cover than any other individual willow species. .... ***Salix lasiandra*** **(Pacific willow) Community Type (p. 165)**

11. Other individual willow species with a greater canopy cover than *Salix lasiandra* (Pacific willow). **12**

12. *Salix bebbiana* (Bebb willow) with a greater canopy cover than any other individual willow species. .... ***Salix bebbiana*** **(Bebb willow) Community Type (p. 132)**

12. Other individual willow species with a greater canopy cover than *Salix bebbiana* (Bebb willow). **13**

13. *Salix exigua* (sandbar willow) with a greater canopy cover than any other individual willow species. .... ***Salix exigua*** **(sandbar willow) Community Type (p. 147)**

13. Other individual willow species with a greater canopy cover than *Salix exigua* (sandbar willow). **14**

14. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology...**Unclassified Riparian or Wetland Site**

    In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

14. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Upland Site**

    Refer to the following publications for possible fit: Youngblood and others 1985b, Padgett and others 1989, and Hansen and others 1995.

KEY TO NON-WILLOW TYPES

1. *Betula occidentalis* (water birch) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Betula occidentalis*** **(water birch) Community Type (p. 187)**

1. *Betula occidentalis* (water birch) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 2

    2. *Alnus incana* (mountain alder) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer...***Alnus incana*** **(mountain alder) Community Type (p. 182)**

    2. *Alnus incana* (mountain alder) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 3

3. *Crataegus douglasii* (black hawthorn) or *C. succulenta* (succulent hawthorn), individually or in combination, with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Crataegus douglasii*** **(black hawthorn) Community Type (p. 193)**

3. *Crataegus douglasii* (black hawthorn) or *C. succulenta* (succulent hawthorn), individually or in combination, with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer... 4

    4. *Acer grandidentatum* (big-tooth maple) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Acer grandidentatum*** **(big-tooth maple) Community Type (p. 180)**

    4. *Acer grandidentatum* (big-tooth maple) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 5

5. *Prunus virginiana* (common chokecherry) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Prunus virginiana*** **(common chokecherry) Community Type (p. 195)**

5. *Prunus virginiana* (common chokecherry) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 6

    6. *Cornus stolonifera* (red-osier dogwood) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Cornus stolonifera*** **(red-osier dogwood) Community Type (p. 189)**

    6. *Cornus stolonifera* (red-osier dogwood) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 7

7. *Rhus aromatica* (fragrant sumac) with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer. ....***Rhus aromatica*** **(fragrant sumac) Community Type (p. 197)**

7. *Rhus aromatica* (fragrant sumac) with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. 8

8. *Rosa woodsii* (woods rose) or *R. acicularis* (prickly rose), individually or in combination, with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer..***Rosa woodsii*** **(woods rose) Community Type (p. 200)**

8. *Rosa woodsii* (woods rose) or *R. acicularis* (prickly rose), individually or in combination, with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer.. **9**

9. *Symphoricarpos occidentalis* (western snowberry) or *S. albus* (common snowberry), individually or in combination, with at least 15 percent canopy cover ***AND WITH*** the greatest canopy cover in the tallest layer..***Symphoricarpos occidentalis*** **(western snowberry) Community Type (p. 201)**

9. *Symphoricarpos occidentalis* (western snowberry) or *S. albus* (common snowberry), individually or in combination, with less than 15 percent canopy cover ***OR WITHOUT*** the greatest canopy cover in the tallest layer. **10**

10. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology...**Unclassified Riparian or Wetland Site**

In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

10. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Upland Site**

Refer to following publications for possible fit: Youngblood and others 1985b, Mueggler 1988, Padgett and others 1989, and Hansen and others 1995.

KEY TO HERBACEOUS TYPES

Herbaceous species present with a combined canopy cover of at least 15 percent, or emergent herbaceous species with at least 5 percent canopy cover.

1. *Carex* species (sedge) with a combined canopy cover of at least 25 percent.......................................**Sedge Key (p. 32)**

1. *Carex* species (sedge) with a combined canopy cover of less than 25 percent. ....**Non-Sedge Key (p. 33)**

KEY TO SEDGE TYPES

1. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), or *C. atherodes* (awned sedge), individually or in combination, with at least 25 percent canopy cover. ....***Carex rostrata*** **(beaked sedge) Habitat Type (p. 213)**

1. *Carex rostrata* (beaked sedge), *C. vesicaria* (inflated sedge), or *C. atherodes* (awned sedge), individually or in combination, with less than 25 percent canopy cover.. **2**

2. *Carex aquatilis* (water sedge) with at least 25 percent canopy cover...***Carex aquatilis*** **(water sedge) Habitat Type (p. 204)**

2. *Carex aquatilis* (water sedge) with less than 25 percent canopy cover. **3**

3. *Carex lasiocarpa* (slender sedge) or *C. lanuginosa* (woolly sedge), individually or in combination, with at least 25 percent canopy cover. ....***Carex lasiocarpa*** **(slender sedge) Habitat Type (p. 208)**

3. *Carex lasiocarpa* (slender sedge) or *C. lanuginosa* (woolly sedge), individually or in combination, with less than 25 percent canopy cover. ....**READ THE FOLLOWING PARAGRAPH**

The following herbaceous communities represent seral or human-caused disturbance communities. Before you use this portion of the key, do the following:

A. Carefully examine the stand and determine if *ANY* shrub species are present. If so, go back through the shrub key and reduce all canopy coverages to "present."

B. If *NO* shrub species are present, then go back through the herbaceous key and reduce all canopy coverages to 5 percent.

C. If the stand still does not key out, then use the following key to ***EITHER*** major seral or disturbance herbaceous community types ***OR*** unclassified riparian or wetland sites.

1. *Carex nebrascensis* (Nebraska sedge) with a greater canopy cover than any other individual sedge species.................... ....***Carex nebrascensis* (Nebraska sedge) Community Type (p. 211)**

1. Other individual sedge species with a greater canopy cover than *Carex nebrascensis* (Nebraska sedge)......................... 2

    2. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology...**Unclassified Riparian or Wetland Site**

    In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

    2. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. ....**Upland Site**

    Refer to the following publications for possible fit: Youngblood and others 1985b, Padgett and others 1989, and Hansen and others 1995.

KEY TO NON-SEDGE TYPES

1. *Typha latifolia* (common cattail) or *T. angustifolia* (narrow-leaved cattail), individually or in combination, with at least 25 percent canopy cover. ....***Typha latifolia* (common cattail) Habitat Type (p. 237)**

1. *Typha latifolia* (common cattail) or *T. angustifolia* (narrow-leaved cattail), individually or in combination, with less than 25 percent canopy cover.. 2

    2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with at least 15 percent canopy cover...***Scirpus acutus* (hardstem bulrush) Habitat Type (p. 232)**

    2. *Scirpus acutus* (hardstem bulrush) or *S. validus* (softstem bulrush), individually or in combination, with less than 15 percent canopy cover.. 3

3. *Scirpus pungens* (sharp bulrush) or *S. americanus* (American bulrush), individually or in combination, with at least 15 percent canopy cover. ....***Scirpus pungens* (sharp bulrush) Habitat Type (p. 235)**

3. *Scirpus pungens* (sharp bulrush) or *S. americanus* (American bulrush), individually or in combination, with less than 15 percent canopy cover. 4

    4. *Phragmites australis* (common reed) with at least 25 percent canopy cover.. .... ***Phragmites australis* (common reed) Habitat Type (p. 227)**

    4. *Phragmites australis* (common reed) with less than 25 percent canopy cover. 5

5. *Phalaris arundinacea* (reed canarygrass) with at least 25 percent canopy cover... ....***Phalaris arundinacea* (reed canarygrass) Habitat Type (p. 226)**

5. *Phalaris arundinacea* (reed canarygrass) with less than 25 percent canopy cover. 6

    6. *Glyceria grandis* (American mannagrass) with at least 25 percent canopy cover. .... ***Glyceria grandis* (American mannagrass) Habitat Type (p. 222)**

6. *Glyceria grandis* (American mannagrass) with less than 25 percent canopy cover... 7

7. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with at least 25 percent canopy cover. .... ***Eleocharis palustris* (common spikesedge) Habitat Type (p. 219)**

7. *Eleocharis palustris* (common spikesedge) or *E. acicularis* (needle spike-rush), individually or in combination, with less than 25 percent canopy cover... **READ THE FOLLOWING PARAGRAPH**

The following herbaceous communities represent seral or human-caused disturbance communities. Before you use this portion of the key, do the following:

A. Carefully examine the stand and determine if ***ANY*** tree or shrub species are present. If so, go back through the tree or shrub key and reduce all canopy coverages to "present."

B. If ***NO*** tree or shrub species are present, then go back through the herbaceous key and reduce all canopy coverages to 5 percent; ignore the presence of the biennial forbs *Melilotus alba* (white sweet-clover) and *Melilotus officinalis* (yellow sweet-clover).

C. If the stand still does not key out, then use the following key to ***EITHER*** major seral or disturbance herbaceous community types ***OR*** unclassified riparian or wetland sites.

1. *Polygonum amphibium* (water smartweed) with a greater canopy cover than any other individual herbaceous species..... ....***Polygonum amphibium* (water smartweed) Community Type (p. 231)**

1. Other individual herbaceous species with a greater canopy cover than *Polygonum amphibium* (water smartweed)......... 2

2. *Bromus inermis* (smooth brome) with a greater canopy cover than any other individual herbaceous species........... .... ***Bromus inermis* (smooth brome) Community Type (p. 217)**

2. Other individual herbaceous species with a greater canopy cover than *Bromus inermis* (smooth brome). 3

3. *Juncus balticus* (Baltic rush) with a greater canopy cover than any other individual herbaceous species. .... ***Juncus balticus* (Baltic rush) Community Type (p. 224)**

3. Other individual herbaceous species with a greater canopy cover than *Juncus balticus* (Baltic rush)............................ 4

4. *Agrostis stolonifera* (redtop) or *Agrostis exarata* (spike bentgrass), individually or in combination, with a greater canopy cover than any other individual herbaceous species.. .... ***Agrostis stolonifera* (redtop) Community Type (p. 216)**

4. Other individual herbaceous species with a greater canopy cover than *Agrostis stolonifera* (redtop) or *Agrostis exarata* (spike bentgrass), individually or in combination.. 5

5. *Hordeum jubatum* (foxtail barley) with a greater canopy cover than any other individual herbaceous species. .... ***Hordeum jubatum* (foxtail barley) Community Type (p. 223)**

5. Other individual herbaceous species with a greater canopy cover than *Hordeum jubatum* (foxtail barley)..................... 6

6. *Xanthium strumarium* (common cocklebur) with a greater canopy cover than any other individual herbaceous species. ....***Xanthium strumarium* (common cockleburr) Community Type (p. 239)**

6. Other individual herbaceous species with a greater canopy cover than *Xanthium strumarium* (common cockleburr)... 7

7. *Poa pratensis* (Kentucky bluegrass) with a greater canopy cover than any other individual herbaceous species. .... ***Poa pratensis* (Kentucky bluegrass) Community Type (p. 229)**

7. Other individual herbaceous species with a greater canopy cover than *Poa pratensis* (Kentucky bluegrass).................. 8

8. Site with at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology.. **Unclassified Riparian or Wetland Site**

In this case, where the site does not fit any other type in the key, name the site in terms of a dominance type (cover type), which is the species with the greatest canopy cover over 25 percent in the overstory, or tallest vegetation layer.

8. Site without at least one of the following wetland attributes present: hydric soils, hydrophytic vegetation, wetland hydrology. .... **Upland Site**

Refer to the following publications for possible fit: Youngblood and others 1985b, Mueggler 1988, Padgett and others 1989, and Hansen and others 1995.

DESCRIPTIONS OF HABITAT TYPES AND MAJOR SERAL COMMUNITY TYPES OF EASTERN AND SOUTHERN IDAHO

CONIFEROUS TREE TYPES

Abies lasiocarpa/Streptopus amplexifolius Habitat Type (Subalpine Fir/Twisted Stalk Habitat Type)

ABILAS/STRAMP (ABLA/STAM2)
Number of Stands Sampled = 10

LOCATION AND ASSOCIATED LANDFORMS

The *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type is an incidental type at mid to upper elevations in mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,424 m (5,115 to 8,000 ft). This forested habitat type may occur on slopes adjacent to seeps/springs, on subirrigated alluvial terraces, or occupy zones along small streams and rivers in U- and V-shaped canyons. *Abies lasiocarpa* (subalpine fir) may dominate both the riparian zone and adjacent uplands in alpine environments. Careful scrutiny of the understory species aids in the delineation of wetland and upland boundaries.

VEGETATION

Abies lasiocarpa (subalpine fir) may codominate mid to late seral stands with *Pseudotsuga menziesii* (Douglas fir) and/or *Picea* species (spruce). At the climax stage, *Abies lasiocarpa* (subalpine fir) forms dense canopies in both the upper and middle structural layers, shading out most understory species. Where the canopy is more open, *Acer glabrum* (Rocky Mountain maple), *Ribes lacustre* (swamp currant), and *Rubus parviflorus* (thimbleberry) may dominate the understory. Characteristic herbaceous species include *Mitella* species (mitrewort), *Thalictrum occidentale* (western meadowrue), *Galium triflorum* (sweetscented bedstraw), *Osmorhiza chilensis* (mountain sweet-cicely), and *arnica cordifolia* (heart-leaf arnica) (Table 4). Although *Streptopus amplexifolius* (twisted stalk) is the signature species and represents one of the indicator understory species for this type, it may not be present at all locations.

Table 4. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type (number = 6 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	24	1-80	100
Picea species (spruce)	36	0-60	83
Pinus contorta (lodgepole pine)	2	0-3	33
Populus tremuloides (quaking aspen)	10	0-10	17
Shrubs			
Acer glabrum (Rocky Mountain maple)	20	0-20	17
Alnus sinuata (Sitka alder)	2	0-3	33
Amelanchier alnifolia (western serviceberry)	1	0-1	17
Berberis repens (creeping Oregongrape)	1	0-1	17
Cassiope mertensiana (Mertens' mountain heather)	1	0-1	17
Chimaphila umbellata (common prince's-pine)	1	0-1	17
Cornus stolonifera (red-osier dogwood)	1	0-1	17
Juniperus communis (common juniper)	1	0-1	17
Ledum glandulosum (Labrador-tea)	2	0-3	33
Linnaea borealis (twinflower)	20	0-20	17
Lonicera utahensis (Utah honeysuckle)	1	0-1	33
Phyllodoce empetriformis (red mountain-heath)	1	0-1	17
Ribes lacustre (swamp currant)	10	0-20	50
Ribes viscosissimum (sticky currant)	1	0-1	17
Rosa acicularis (prickly rose)	1	0-1	17
Rubus parviflorus (thimbleberry)	20	0-20	17
Salix barclayi (Barclay's willow)	1	0-1	17
Salix scouleriana (Scouler willow)	1	0-1	17
Sorbus scopulina (Cascade mountain-ash)	1	0-1	17
Spiraea betulifolia (shiny-leaf spiraea)	1	0-1	17
Symphoricarpos oreophilus (mountain snowberry)	1	0-1	17
Vaccinium globulare (globe huckleberry)	2	0-3	67
Vaccinium scoparium (whortleberry)	7	0-20	67
Graminoids			
Agrostis exarata (spike bentgrass)	1	0-1	17
Agrostis stolonifera (redtop)	1	0-1	17
Bromus carinatus (mountain brome)	3	0-3	17
Bromus vulgaris (Columbia brome)	1	0-1	17
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	17
Calamagrostis rubescens (pinegrass)	20	0-20	17
Carex disperma (soft-leaved sedge)	1	0-1	33
Carex geyeri (elk sedge)	3	0-3	17
Carex nigricans (black alpine sedge)	1	0-1	17

Table 4 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Carex raynoldsii (Raynolds' sedge)	1	0-1	17
Grass perennial (perennial grass)	3	0-3	17
Juncus drummondii (Drummond's rush)	1	0-1	17
Luzula hitchcockii (smooth woodrush)	20	0-20	17
Luzula parviflora (small-flowered woodrush)	1	0-1	17
Luzula piperi (Piper's woodrush)	3	0-3	17
Melica spectabilis (showy oniongrass)	1	0-1	17
Phleum alpinum (alpine timothy)	1	0-1	17
Forbs			
Achillea millefolium (common yarrow)	3	0-3	17
Actaea rubra (baneberry)	3	0-3	17
Allium brevistylum (short-style onion)	1	0-1	17
Aquilegia flavescens (yellow columbine)	1	0-1	33
Arnica cordifolia (heart-leaf arnica)	2	0-3	50
Arnica latifolia (broadleaf arnica)	8	0-20	50
Arnica mollis (hairy arnica)	3	0-3	17
Aster conspicuus (showy aster)	3	0-3	33
Aster foliaceus (leafy aster)	1	0-1	17
Aster laevis (smooth aster)	1	0-1	17
Balsamorhiza sagittata (arrowleaf balsamroot)	1	0-1	17
Castilleja rhexifolia (rhexia-leaved paintbrush)	1	0-1	17
Claytonia lanceolata (western springbeauty)	1	0-1	33
Collinsia parviflora (small-flowered blue-eyed Mary)	1	0-1	17
Corallorhiza trifida (yellow coral-root)	1	0-1	17
Delphinium nuttallianum (Nuttall's larkspur)	1	0-1	17
Dodecatheon jeffreyi (tall mountain shooting star)	3	0-3	17
Epilobium alpinum (alpine willow-herb)	1	0-1	33
Epilobium angustifolium (fireweed)	2	0-3	33
Erigeron peregrinus (subalpine daisy)	2	0-3	33
Erythronium grandiflorum (glacier-lily)	2	0-3	50
Fragaria vesca (woods strawberry)	1	0-1	17
Fragaria virginiana (Virginia strawberry)	3	0-3	17
Galium triflorum (sweetscented bedstraw)	11	0-20	33
Geranium richardsonii (white geranium)	3	0-3	17
Geranium viscosissimum (sticky geranium)	3	0-3	17

Table 4 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-1	17
Habenaria saccata (slender bog-orchid)	3	0-3	17
Heracleum lanatum (cow-parsnip)	1	0-1	17
Hieracium albiflorum (white-flowered hawkweed)	1	0-1	17
Hieracium gracile (alpine hawkweed)	1	0-1	17
Hydrophyllum capitatum (ballhead waterleaf)	1	0-1	17
Ligusticum tenuifolium (slender-leafed licorice-root)	1	0-1	17
Listera cordata (heart-leaf twayblade)	1	0-1	17
Lithophragma parviflorum (smallflower woodlandstar)	1	0-1	17
Lomatium ambiguum (swale desert-parsley)	3	0-3	17
Lupinus polyphyllus (many-leaved lupine)	3	0-3	17
Mertensia ciliata (mountain bluebell)	20	0-20	17
Mitella breweri (Brewer's mitrewort)	3	0-3	17
Mitella pentandra (five-stamened mitrewort)	5	0-10	50
Osmorhiza chilensis (mountain sweet-cicely)	7	0-20	50
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	17
Parnassia fimbriata (fringed grass-of-parnassus)	20	0-20	17
Pedicularis bracteosa (bracted lousewort)	1	0-1	33
Polygonum bistortoides (American bistort)	1	0-1	17
Potentilla gracilis (slender cinquefoil)	3	0-3	17
Pyrola asarifolia (pink wintergreen)	1	0-1	17
Pyrola chlorantha (green wintergreen)	1	0-1	33
Pyrola secunda (one-sided wintergreen)	3	0-3	17
Ranunculus eschscholtzii (subalpine buttercup)	1	0-1	17
Ranunculus species (buttercup)	3	0-3	17
Ranunculus verecundus (modest buttercup)	1	0-1	17
Saxifraga arguta (brook saxifrage)	20	0-40	50
Senecio foetidus (sweet-marsh butterweed)	1	0-1	17
Senecio triangularis (arrowleaf groundsel)	16	0-40	67
Smilacina stellata (starry Solomon-plume)	1	0-1	17
Streptopus amplexifolius (clasping-leaved twisted-stalk)	9	0-20	50

Table 4 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Taraxacum officinale (common dandelion)	1	0-1	33
Thalictrum occidentale (western meadowrue)	7	0-10	67
Trollius laxus (American globeflower)	11	0-20	33
Valeriana occidentalis (western valerian)	1	0-1	17
Veratrum viride (green false hellebore)	3	0-3	17
Veronica wormskjoldii (Wormskjold speedwell)	1	0-1	33
Viola nuttallii (yellow prairie violet)	1	0-1	17
Viola orbiculata (round-leaved violet)	1	0-1	33
Xerophyllum tenax (beargrass)	20	0-20	17
Equisetum arvense (field horsetail)	20	0-20	17
Ferns and Allies			
Gymnocarpium dryopteris (oak-fern)	1	0-1	17

SUCCESSIONAL INFORMATION

Pseudotsuga menziesii (Douglas fir) and *Picea* species (spruce) represent codominants in late seral stands, but eventually decline as the stand moves toward climax. Seral stands of *Abies lasiocarpa* (subalpine fir) typically contain limited coverages of *Pinus contorta* (lodgepole pine) on slightly drier sites, where forested upland and wetland communities blend at the ecotones. Wetter sites can be populated with *Populus tremuloides* (quaking aspen), suggesting a potential seral stage within the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type (Table 5).

Table 5. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Abies lasiocarpa/ Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type (number = 4 stands)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	40	20-60	100
Picea species (spruce)	40	0-40	25
Pinus contorta (lodgepole pine)	11	0-20	50
Pseudotsuga menziesii (Douglas fir)	40	0-80	75
Shrubs			
Acer glabrum (Rocky Mountain maple)	20	0-20	50
Acer grandidentatum (bigtooth maple)	1	0-1	25
Amelanchier alnifolia (western serviceberry)	8	0-10	75
Arctostaphylos uva-ursi (kinnikinnick)	10	0-10	25
Berberis repens (creeping Oregongrape)	3	0-3	50
Chimaphila menziesii (little prince's-pine)	3	0-3	25
Clematis occidentalis (Columbia clematis)	3	0-3	25
Cornus stolonifera (red-osier dogwood)	3	0-3	25
Lonicera involucrata (twin-berry)	3	0-3	25
Lonicera utahensis (Utah honeysuckle)	1	0-1	25
Pachistima myrsinites (mountain-boxwood)	3	0-3	25
Prunus virginiana (common chokecherry)	1	0-1	25
Ribes lacustre (swamp currant)	3	0-3	75
Ribes viscosissimum (sticky currant)	3	0-3	50
Rosa woodsii (woods rose)	7	0-10	75
Rubus parviflorus (thimbleberry)	10	0-20	75
Sambucus racemosa (red elderberry)	3	0-3	25
Shepherdia canadensis (Canada buffaloberry)	1	0-1	25
Sorbus scopulina (Cascade mountain-ash)	20	0-20	25
Spiraea betulifolia (shiny-leaf spiraea)	20	0-20	25
Symphoricarpos albus (common snowberry)	20	0-20	25
Symphoricarpos occidentalis (western snowberry)	3	0-3	50
Vaccinium globulare (globe huckleberry)	1	0-1	25
Vaccinium membranaceum (big huckleberry)	3	0-3	25
Vaccinium scoparium (whortleberry)	1	0-1	25
Graminoids			
Agropyron repens (quackgrass)	10	0-10	25
Bromus anomalus (nodding brome)	3	0-3	25
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	25
Calamagrostis rubescens (pinegrass)	20	0-20	25
Calamagrostis stricta (narrow-spiked reedgrass)	3	0-3	25
Carex scopulorum (Holm's Rocky Mountain sedge)	1	0-1	25
Elymus cinereus (basin wildrye)	1	0-1	25
Elymus glaucus (blue wildrye)	2	0-3	50
Festuca subulata (bearded fescue)	3	0-3	25
Poa pratensis (Kentucky bluegrass)	3	0-3	25

Table 5 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Forbs			
Achillea millefolium (common yarrow)	2	0-3	50
Aconitum columbianum (Columbian monkshood)	1	0-1	25
Actaea rubra (baneberry)	3	0-3	50
Arnica cordifolia (heart-leaf arnica)	3	0-3	75
Arnica latifolia (broadleaf arnica)	3	0-3	25
Aster engelmannii (Engelmann's aster)	3	0-3	25
Aster modestus (few-flowered aster)	1	0-1	25
Aster occidentalis (western aster)	1	0-1	25
Circaea alpina (Enchanter's nightshade)	3	0-3	25
Disporum trachycarpum (wartberry fairy-bell)	2	0-3	75
Epilobium angustifolium (fireweed)	1	0-1	50
Epilobium ciliatum (common willow-herb)	1	0-1	25
Erigeron peregrinus (subalpine daisy)	1	0-1	25
Fragaria virginiana (Virginia strawberry)	2	0-3	75
Galium triflorum (sweetscented bedstraw)	7	1-20	100
Geranium richardsonii (white geranium)	1	0-1	25
Geranium viscosissimum (sticky geranium)	6	0-10	50
Geum macrophyllum (larged-leaved avens)	3	0-3	25
Heracleum lanatum (cow-parsnip)	1	0-1	50
Listera cordata (heart-leaf twayblade)	1	0-1	25
Mertensia ciliata (mountain bluebell)	1	0-1	25
Mitella breweri (Brewer's mitrewort)	3	0-3	75
Mitella pentandra (five-stamened mitrewort)	1	0-1	25
Nepeta cataria (catnip)	1	0-1	25
Osmorhiza chilensis (mountain sweet-cicely)	6	1-10	100
Pyrola asarifolia (pink wintergreen)	1	0-1	25
Pyrola elliptica (white wintergreen)	1	0-1	25
Pyrola secunda (one-sided wintergreen)	1	0-1	25
Pyrola uniflora (woodnymph)	1	0-1	25
Saxifraga arguta (brook saxifrage)	1	0-1	25
Senecio pseudaureus (streambank groundsel)	1	0-1	25
Senecio triangularis (arrowleaf groundsel)	3	0-3	25
Silene menziesii (Menzies' silene)	10	0-10	25
Smilacina racemosa (false spikenard)	3	0-3	50
Smilacina stellata (starry Solomon-plume)	3	0-3	25
Stellaria jamesiana (sticky starwort)	3	0-3	25
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	25
Taraxacum officinale (common dandelion)	3	0-3	25
Thalictrum occidentale (western meadowrue)	14	3-40	100
Trollius laxus (American globeflower)	1	0-1	25
Urtica dioica (stinging nettle)	1	0-1	25
Ferns and Allies			
Cystopteris fragilis (brittle bladder-fern)	3	0-3	25
Equisetum arvense (field horsetail)	1	0-1	50

SOILS

The litter/duff layer, primarily needles and small twigs, may reach a thickness of 10 cm (4 in) or more, but is generally much thinner. An underlying organic layer, when present, reaches depths of 15 cm (6 in) on some sites but is often less than 7.5 cm (3 in). Boulders and large rocks occur near the surface, often underlying a silt layer that ranges from 2.5 to 45 cm (1-18 in). Clay may or may not be a component; however, alluvial materials in the form of cobbles, gravels, and sands, typically comprise 50 percent or more of the substratum. Steele and others (1983) concluded that parent materials are primarily granitics and basalt, but may include quartzite, and rhyolite. Water tables tend to be within 30 cm (1 ft) of the ground surface for at least part of the year.

ADJACENT COMMUNITIES

Populus tremuloides (quaking aspen) and *Abies lasiocarpa* (subalpine fir) stands may converge where alpine seeps and springs surface. *Wyethia* species (mule's-ears) can occupy significant coverage as adjacent open meadows or as an understory component with *Populus tremuloides* (quaking aspen) in northeastern Idaho along the Montana and Wyoming borders. Adjacent wetter communities include *Salix geyeriana* (Geyer willow) and *Betula occidentalis* (water birch). *Picea* species (spruce), *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine) and/or *Pseudotsuga menziesii* (Douglas fir) generally dominate the adjacent uplands, either developing individually as homogeneous stands, or more often, as mosaics.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value is high for this habitat type. Adjacent streams may act as another attractive feature for livestock.

Grazing during wet periods can churn the wet soil and destroy plant cover as well as limit conifer establishment and should be avoided where possible (Hansen and others 1995).

Timber
Timber productivity for *Abies lasiocarpa* (subalpine fir) ranges from moderate, where cold air drainage is impeded and soils are saturated throughout the year, to high on sites with better drainage (Hansen and others 1995).

Blowdown may be a hazard in this habitat type. Removal of decadent, old growth trees, leaving younger, windfirm species often leaves the Streamside Management Zone in better condition to withstand winds following logging. However, if retention of old growth for fish and wildlife habitat (including cavity dwelling birds) is a primary objective, then prescriptions must be designed to minimize blowdown (Hansen and others 1995). Cooper and others (1991) report that clear cutting will reduce the high probability of windthrow associated with partial cutting, but the resulting rise in water tables may produce herb-dominated meadows that reforest very slowly. Light selection cutting may avoid these problems, but heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainages.

Pseudotsuga menziesii (Douglas fir) is a major seral species while *Pinus contorta* (lodgepole pine) acts only in a minor capacity. Even aged management offers greater promise for production of seral species. Partial cutting will lead to dominance by the less desirable climax species. Exposure of bare soil may be required for regeneration of *Pseudotsuga menziesii* (Douglas fir).

Heavy partial cutting or harvesting of adjacent stands by even aged systems will accelerate windthrow of large trees. If large numbers of uprooted trees lead to water quality problems, then removal may be appropriate. Silvicultural prescriptions must be tempered by clearly defined, obtainable objectives and on site evaluation of existing stands (Hansen and others 1995).

Wildlife
Browse production and cover levels in early successional stages are good to excellent for elk, deer, bear, and moose. Good cover is also provided for upland game and small mammals. Elk and deer may use low elevation stands as winter range if snow depths are low. Overwintering moose can have a tremendous impact on seedlings of *Abies lasiocarpa* (subalpine fir). Reduction or elimination of the seral shrub species tends to hasten succession toward climax with less suitable food being available for big game (Steele and others, 1983). In this case, logging or burning the stand may renew production of the browse species.

Soil Management and Rehabilitation Opportunities
Moist, fine textured soils are subject to compaction and damage in spring and early summer when water tables are high. Heavy equipment should be restricted to this habitat type when soils have dried out or are frozen and snow covered to reduce the danger of soil compaction. Efforts to minimize displacement or disturbance of the soil surface during timber management activities should be made to maintain the high productivity of these sites (Hansen and others 1995).

Heavy equipment use should be delayed until the late summer. Roads, trails, or other site development should be avoided and should be located on adjacent uplands. Cole (1983) showed trails crossing this habitat type to be in much poorer condition than those located in habitat types with better drainage.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Hansen and others (1995) describe this habitat type in Montana. Two phases are recorded for the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type: *Streptopus amplexifolius* (twisted stalk) phase and the *Menziesia ferruginea* (fool's huckleberry) phase. However, *Menziesia ferruginea* (fool's huckleberry) was not observed in stands collected in Idaho, rendering the phase distinction unnecessary. Both Cooper and others (1991) and Steele and others (1983) describe a series of *Abies lasiocarpa* (subalpine fir) habitat types for forests of northern and central Idaho, including the *Abies lasiocarpa/Streptopus amplexifolius* (subalpine fir/twisted stalk) habitat type. However, only Steele and others (1983) distinguish the *Streptopus amplexifolius* (twisted stalk) phase, which is currently used by Hansen and others (1995) and appears to match the habitat type observed in eastern and southern Idaho.

Juniperus osteosperma/Cornus stolonifera Habitat Type (Utah Juniper/Red-Osier Dogwood Habitat Type)

JUNOST/CORSTO (JUOS/COST4)
Number of Stands Sampled = 3

LOCATION AND ASSOCIATED LANDFORMS

The *Juniperus osteosperma/Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type occurs at mid to lower elevations in narrow mountain valleys and foothills of southcentral Idaho. Elevations range from 1,460 to 1,880 m (4,790 to 6,200 ft). This incidental type forms narrow bands along intermittent or seasonal streams at the bottom of V-shaped canyons and adjacent to headwater springs.

VEGETATION

The *Juniperus osteosperma/Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type is characterized by a relatively open canopy with widely scattered individuals. The undergrowth is quite variable. Associated species include: *Cornus stolonifera* (red-osier dogwood), *Salix exigua* (sandbar willow), *Prunus virginiana* (common chokecherry), and *Ribes odoratum* (buffalo currant). *Rhus aromatica* (fragrant sumac) *Rosa woodsii* (woods rose), *Bromus tectorum* (cheatgrass), and *Poa pratensis* (Kentucky bluegrass) increase under disturbance regimes (Table 6). This type occupies extremely dry regions, where trees and most shrub species persist only along the immediate streambank and channel. The understory is generally sparse in places, but where soils are moist, graminoid coverage may be dense.

Table 6. Average canopy cover, range of canopy cover, and constancy for species recorded in early to mid-seral and/or disturbed stands of the *Juniperus osteosperma/Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type (number = 3 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus osteosperma (Utah juniper)	40	30-50	100
Shrubs			
Artemisia cana (silver sagebrush)	3	0-3	33
Artemisia tridentata (big sagebrush)	2	1-3	100
Chrysothamnus nauseosus (common rabbitbrush)	1	0-1	33
Clematis ligusticifolia (western virgins-bower)	4	1-10	100
Prunus virginiana (common chokecherry)	10	0-10	33
Rhus aromatica (fragrant sumac)	75	0-90	67
Ribes odoratum (buffalo currant)	7	0-10	67
Rosa woodsii (woods rose)	8	3-10	100
Salix exigua (sandbar willow)	3	0-3	67
Symphoricarpos oreophilus (mountain snowberry)	1	0-1	33
Toxicodendron rydbergii (poison ivy)	1	0-1	33
Graminoids			
Agrostis exarata (spike bentgrass)	3	0-3	33
Bromus tectorum (cheatgrass)	12	0-20	67
Carex microptera (small-winged sedge)	1	0-1	33
Deschampsia elongata (slender hairgrass)	3	0-3	33
Eleocharis species (spike-rush)	3	0-3	33
Elymus cinereus (basin wildrye)	1	0-1	33
Festuca species (fescue)	3	0-3	33
Juncus balticus (Baltic rush)	10	0-10	33
Juncus species (Rush)	1	0-1	33
Melica bulbosa (oniongrass)	3	0-3	33
Poa bulbosa (bulbous bluegrass)	6	0-10	67
Poa pratensis (Kentucky bluegrass)	35	0-40	67
Forbs			
Achillea millefolium (common yarrow)	6	0-10	67
Allium species (onion)	3	0-3	33
Aquilegia formosa (sitka columbine)	3	0-3	33
Artemisia ludoviciana (prairie sagewort)	3	0-3	33
Aster species (aster)	3	0-3	33
Cirsium vulgare (bull thistle)	1	0-1	33
Conyza canadensis (horseweed)	2	0-3	67
Epilobium angustifolium (fireweed)	3	0-3	33
Galium aparine (goose-grass)	3	0-3	67
Lithophragma parviflorum (smallflower woodlandstar)	1	0-1	33
Lupinus species (lupine)	1	0-1	33
Mentha arvensis (field mint)	3	0-3	33
Mertensia species (bluebell)	10	0-10	33
Mimulus guttatus (common monkey-flower)	10	0-10	33
Montia perfoliata (miner's lettuce)	3	0-3	33
Myosotis species (forget-me-not)	3	0-3	33
Nasturtium officinale (water-cress)	1	0-1	33
Plantago major (common plantain)	3	0-3	33
Potentilla biennis (biennial cinquefoil)	3	0-3	33
Rumex crispus (curly dock)	2	0-3	67
Sisymbrium altissimum (tumblemustard)	1	0-1	33
Solidago missouriensis (Missouri goldenrod)	3	0-3	33
Taraxacum officinale (common dandelion)	20	0-20	33
Tragopogon dubius (goat's beard)	1	0-1	33
Trifolium repens (white clover)	10	0-10	33

Table 6 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Urtica dioica (stinging nettle)	3	0-3	33
Veronica americana (American speedwell)	10	0-10	33
Verbascum thapsus (common mullein)	2	0-3	67
Vicia species (vetch)	1	0-1	33

SUCCESSIONAL INFORMATION

Populus tremuloides (quaking aspen), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), and *Betula occidentalis* (water birch) may represent mid-seral communities within the successional pathways that lead to the *Juniperus osteosperma/Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type. Where *Juniperus osteosperma* (Utah juniper) forms a mosaic with *Populus tremuloides* (quaking aspen) and various shrubs along stream systems, it dominates drier portions of the riparian zone. Desiccation of the streamside zone, whether the result of human-caused disturbances or natural occurrences such as shifts in climatic trends, causes the decline of the deciduous trees and tall shrubs, leaving *Juniperus osteosperma* (Utah juniper) as the sole remaining overstory species.

SOILS

Soil textures for this habitat type range from silty clay loams to silt loams. Alluvial silts, clays, and fine sands often predominate (40-80 percent) in the upper soil solum, sometimes to depths of 90 cm (36 in) or more. Fine/coarse sands and gravels may comprise up to 40 percent of the lower substratum, promoting drainage. Boulders and large rocks are frequent in some areas, and cobbles are often present on site. This type tolerates periodic flooding and moderately high water tables, but may not survive prolonged inundation. It often occupies ephemeral streams where hydrologic flows become subsurface for portions of the year, especially during late summer and fall drought conditions. Fragipan clays may become cracked and split during this time of the year, possibly exposing roots and rhizomes. Needle/leaf litter may be 2-5 cm (1-2 in) deep and dominates the understory where overstory canopies are dense.

ADJACENT COMMUNITIES

Adjacent wetter communities may be dominated by a variety of types including *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), *Betula occidentalis* (water birch), and *Populus tremuloides* (quaking aspen). Uplands are characteristically vegetated with mixed grass/shrublands dominated by *Juniperus osteosperma* (Utah juniper), *Artemisia tridentata* (big sagebrush), and *Chrysothamnus nauseosus* (common rabbitbrush). *Juniperus osteosperma* (Utah juniper) generally occupies marginally riparian sites that persist along narrow stream corridors. Grasses and sedges may flourish directly in or adjacent to the stream itself, but the riparian zone usually ends within a few feet of the streambank where *Artemisia* species (sagebrush) dominates.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The palatability of *Juniperus osteosperma* (Utah juniper) rates low for livestock, although young plants can be eliminated by grazing. Nevertheless, this habitat type generally receives heavy use by cattle, even in steep sided canyons where access is precarious. The presence of sedges, grasses, and palatable shrubs in a xeric environment, coupled with a source of water, results in significant disturbance to these communities, especially in the form of pugging and bank instability.

Cornus stolonifera (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995). Long-term utilization may result in the loss of native species and subsequent replacement by weedy invaders, and should be restricted where possible.

Timber

Due to the wide spacing of trees scattered throughout this habitat type, timber harvest activities appear to be uneconomical; however, *Juniperus osteosperma* (Utah juniper) may be the only form of wood in the region and may be of value for round wood products such as pencils and fence posts (Cronquist and others 1986).

Wildlife

Deer use this habitat type for forage and cover. *Juniperus osteosperma* (Utah juniper) may constitute the only source of shade where it is found, and represents a haven for birds and small mammals both as a source of food and cover.

Fire

Fire potential is low to moderate in this type. Young *Juniperus* species (juniper) trees are easily killed by fire primarily because of their small size, thin bark, and compact crown (Fischer and Bradley 1987). As *Juniperus* species (juniper) ages, the bark thickens and the crown develops a bushy, open growth form. A hot fire can kill or severely damage a tree, but the same tree may survive a cool fire. Low, spreading branches can provide a route for fire to enter the crown. Often large junipers have survived a number of fires.

Soil Management and Rehabilitation Opportunities

Although sands, gravels, and cobbles are present, silts and clays that constitute the main body of soil in the *Juniperus osteosperma/Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type are susceptible to compaction. This habitat type is generally restricted to the immediate streambank and channel, and the absence of deep-rooted shrubs on disturbed sites does little to strengthen bank stability. Destructive floods during the spring may further compound the problem of stability and water quality. Livestock and vehicular traffic should be monitored on steep drainages with sparsely vegetated streambanks.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Stands of this habitat type are generally too small or too inaccessible to be used as developed campgrounds. However, *Juniperus* species (juniper) woodlands do provide excellent opportunities for nature study areas because of the diversity of wildlife associated with them (Hansen and other 1995). *Juniperus osteosperma* (Utah juniper) is also used as an ornamental throughout it native range (Cronquist and others 1986).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Steele and others (1981) refer to *Juniperus osteosperma* (Utah juniper) woodlands when discussing pinyon-juniper habitat types, but no other riparian or wetland communities for this particular vegetation type have been described elsewhere at this time.

Juniperus scopulorum/Cornus stolonifera Habitat Type (Rocky Mountain Juniper/Red-Osier Dogwood Habitat Type)

JUNSCO/CORSTO (JUSC2/COST4)
Number of Stands Sampled = 22

LOCATION AND ASSOCIATED LANDFORMS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type is considered a major type at mid to lower elevations in valleys and foothills of Idaho. Elevations of sampled sites range from 1,030 to 1,940 m (3,400 to 6,400 ft). The habitat type may form narrow, stringer communities paralleling stream bottoms of V-shaped canyons, or clumped stands near headwater springs. Where it occurs adjacent to larger streams and rivers on older alluvial terraces, this type emerges as a mosaic with other deciduous tree and shrub species in broad stands. In general, this habitat type is found on drier riparian sites.

VEGETATION

In Idaho, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type characteristically develops an open canopy of widely scattered *Juniperus scopulorum* (Rocky Mountain juniper) on broad alluvial benches. Mid-seral stands may be dominated by *Populus angustifolia* (narrowleaf cottonwood) and/or *Populus trichocarpa* (black cottonwood). In narrow canyons and draws where *Juniperus scopulorum* (Rocky Mountain juniper) develops a closed canopy, other tree species are essentially absent, except for occasional *Pseudotsuga menziesii* (Douglas fir). The undergrowth for this habitat type, which varies considerably from site to site, may include: *Cornus stolonifera* (red-osier dogwood), *Rosa woodsii* (woods rose), *Betula occidentalis* (water birch), *Prunus virginiana* (common chokecherry), and *Poa pratensis* (Kentucky bluegrass) (Table 7).

Table 7. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type (number = 3 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	60	40-80	100
Pseudotsuga menziesii (Douglas fir)	3	0-3	33
Shrubs			
Acer glabrum (Rocky Mountain maple)	20	0-20	33
Acer grandidentatum (bigtooth maple)	3	0-3	33
Berberis repens (creeping Oregongrape)	10	0-10	33
Betula occidentalis (water birch)	10	0-10	67
Clematis ligusticifolia (western virgins-bower)	7	0-10	67
Cornus stolonifera (red-osier dogwood)	28	3-60	100
Pachistima myrsinites (mountain-boxwood)	30	0-30	33
Prunus virginiana (common chokecherry)	20	0-20	67

Table 7 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Ribes lacustre (swamp currant)	1	0-1	33
Ribes odoratum (buffalo currant)	1	0-1	33
Rosa woodsii (woods rose)	7	0-10	67
Salix exigua (sandbar willow)	3	0-3	33
Salix lutea (yellow willow)	2	0-3	67
Sambucus cerulea (blue elderberry)	3	0-3	33
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	67
Agrostis stolonifera (redtop)	3	0-3	33
Bromus commutatus (hairy brome)	3	0-3	33
Carex species (sedges)	3	0-3	33
Dactylis glomerata (orchard-grass)	1	0-1	33
Elymus cinereus (basin wildrye)	3	0-3	33
Elymus glaucus (blue wildrye)	3	0-3	33
Poa pratensis (Kentucky bluegrass)	3	0-3	67
Forbs			
Arabis hirsuta (hairy rockcress)	1	0-1	33
Arctium minus (common burdock)	3	0-3	33
Aster eatonii (Eaton's aster)	1	0-1	33
Cicuta maculata (spotted water-hemlock)	3	0-3	33
Cirsium arvense (Canada thistle)	1	0-1	33
Cirsium vulgare (bull thistle)	1	0-1	33
Cynoglossum officinale (common hound's-tongue)	3	0-3	67
Disporum trachycarpum (wartberry fairy-bell)	3	0-3	33
Galium triflorum (sweetscented bedstraw)	1	0-1	33
Geum macrophyllum (larged-leaved avens)	1	0-1	33
Lactuca serriola (prickly lettuce)	10	0-10	33
Lappula redowskii (western stickseed)	3	0-3	33
Nepeta cataria (catnip)	3	0-3	33
Osmorhiza chilensis (mountain sweet-cicely)	10	0-10	33
Rumex crispus (curly dock)	1	0-1	33
Senecio serra (tall butterweed)	1	0-1	33
Smilacina racemosa (false spikenard)	10	0-10	33
Smilacina stellata (starry Solomon-plume)	30	0-30	33
Solidago canadensis (Canada goldenrod)	3	0-3	33
Taraxacum officinale (common dandelion)	3	0-3	33
Urtica dioica (stinging nettle)	3	0-3	33
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	3	0-3	67

SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by *Populus trichocarpa* (black cottonwood), *Populus angustifolia* (narrowleaf cottonwood), or various shrub species, such as willows or *Betula occidentalis* (water birch). In these seral stands, *Juniperus scopulorum* (Rocky Mountain juniper) will be present and successfully reproducing, but may only dominate the understory, especially in mature *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) forests. Stands may persist in this seral stage for decades, but eventually the more shade-tolerant *Juniperus scopulorum* (Rocky Mountain juniper) will prevail as the taller, deciduous tree species, barring disturbance and seedling propagation, decline (Table 8).

Table 8. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and or early to mid-seral to climax stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type (number = 19 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	28	3-90	100
Picea species (spruce)	1	0-1	16
Populus angustifolia (narrowleaf cottonwood)	46	0-60	37
Populus trichocarpa (black cottonwood)	50	0-60	11
Shrubs			
Acer grandidentatum (bigtooth maple)	3	0-3	5
Alnus incana (mountain alder)	3	0-3	5
Amelanchier alnifolia (western serviceberry)	2	0-3	16
Arctostaphylos uva-ursi (kinnikinnick)	8	0-20	21
Artemisia tridentata (big sagebrush)	2	0-3	26
Betula occidentalis (water birch)	25	0-80	47
Chrysothamnus nauseosus (common rabbitbrush)	1	0-1	5
Chrysothamnus viscidiflorus (green rabbitbrush)	3	0-3	11
Clematis ligusticifolia (western virgins-bower)	18	0-40	37
Cornus stolonifera (red-osier dogwood)	18	0-60	42
Crataegus douglasii (black hawthorn)	1	0-1	5
Elaeagnus commutata (silverberry)	11	0-20	11
Lonicera involucrata (twin-berry)	1	0-1	5
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	5

Table 8 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Prunus virginiana (common chokecherry)	22	0-40	11
Purshia tridentata (antelope bitter-brush)	1	0-1	5
Rhus aromatica (fragrant sumac)	20	0-20	11
Ribes species (currant; gooseberry)	2	0-3	16
Ribes lacustre (swamp currant)	1	0-1	16
Ribes odoratum (buffalo currant)	5	0-20	26
Ribes setosum (Missouri gooseberry)	3	0-3	11
Rosa acicularis (prickly rose)	60	0-60	5
Rosa woodsii (woods rose)	7	0-20	89
Rubus idaeus (red raspberry)	3	0-3	5
Salix bebbiana (Bebb willow)	1	0-1	5
Salix boothii (Booth willow)	37	0-50	16
Salix exigua (sandbar willow)	14	0-40	21
Salix geyeriana (Geyer willow)	3	0-3	5
Salix lutea (yellow willow)	8	0-30	42
Shepherdia canadensis (Canada buffaloberry)	3	0-3	5
Solanum dulcamara (climbing nightshade)	3	0-3	5
Spiraea betulifolia (shiny-leaf spiraea)	3	0-3	5
Symphoricarpos albus (common snowberry)	2	0-3	11
Symphoricarpos occidentalis (western snowberry)	25	0-60	26
Toxicodendron rydbergii (poison ivy)	1	0-1	11
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	16
Agropyron cristatum (crested wheatgrass)	1	0-1	5
Agropyron intermedium (intermediate wheatgrass)	1	0-1	5
Agropyron species (wheatgrass)	1	0-1	5
Agropyron smithii (western wheatgrass)	12	0-20	11
Agrostis stolonifera (redtop)	20	0-60	26
Bromus carinatus (mountain brome)	12	0-20	11
Bromus ciliatus (fringed brome)	1	0-1	5
Bromus commutatus (hairy brome)	11	0-20	11
Bromus inermis (smooth brome)	8	0-20	21
Bromus japonicus (Japanese brome)	30	0-30	5
Bromus tectorum (cheatgrass)	29	0-60	32
Carex species (sedges)	2	0-3	11
Carex stipata (sawbeak sedge)	1	0-1	5
Dactylis glomerata (orchard-grass)	36	0-70	11
Eleocharis compressa (flatstem spike-rush)	12	0-20	11
Elymus canadensis (Canada wildrye)	3	0-3	5
Elymus cinereus (basin wildrye)	3	0-3	26
Elymus virginicus (Virginia wildrye)	11	0-20	11

Table 8 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Hordeum brachyantherum (meadow barley)	1	0-1	5
Hordeum jubatum (foxtail barley)	1	0-1	5
Juncus balticus (Baltic rush)	16	0-40	21
Phleum pratense (common timothy)	6	0-20	21
Poa palustris (fowl bluegrass)	7	0-10	11
Poa pratensis (Kentucky bluegrass)	18	0-80	95
Scirpus validus (softstem bulrush)	1	0-1	5
Forbs			
Achillea millefolium (common yarrow)	1	0-1	16
Actaea rubra (baneberry)	3	0-3	5
Allium brevistylum (short-style onion)	1	0-1	5
Apocynum androsaemifolium (spreading dogbane)	12	0-20	11
Arabis species (rockcress)	1	0-1	5
Arabis holboellii (Holboell's rockcress)	1	0-1	5
Arctium minus (common burdock)	17	0-30	11
Arnica chamissonis (meadow arnica)	1	0-1	5
Arnica longifolia (longleaf arnica)	1	0-1	5
Artemisia ludoviciana (prairie sagewort)	1	0-1	5
Asparagus officinalis (asparagus)	1	0-1	5
Aster chilensis (long-leaved aster)	20	0-20	5
Aster conspicuus (showy aster)	20	0-20	5
Aster species (aster)	7	0-20	21
Astragalus miser (weedy milk-vetch)	3	0-3	5
Aster occidentalis (western aster)	3	0-3	5
Astragalus species (milk-vetch; orophaca)	1	0-1	5
Berula erecta (cut-leaved water-parsnip)	1	0-1	5
Camelina microcarpa (littlepod falseflax)	1	0-1	5
Castilleja miniata (scarlet paintbrush)	10	0-10	5
Chenopodium album (lambsquarter)	1	0-1	5
Cirsium arvense (Canada thistle)	11	0-20	26
Cirsium scariosum (elk thistle)	1	0-1	5
Cirsium species (thistle)	1	0-1	5
Collomia linearis (narrow-leaf collomia)	1	0-1	5
Comandra species (toad-flax)	1	0-1	5
Cynoglossum officinale (common hound's-tongue)	5	0-10	16
Descurainia pinnata (pinnate tansymustard)	3	0-3	5
Dipsacus fullonum (teasel)	1	0-1	5
Epilobium angustifolium (fireweed)	2	0-3	11
Epilobium paniculatum (autumn willow-herb)	3	0-3	5
Erigeron glabellus (smooth daisy)	1	0-1	11

Table 8 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Eriogonum heracleoides (wyeth buckwheat)	1	0-1	5
Forb	1	0-1	11
Fragaria virginiana (Virginia strawberry)	12	0-20	21
Galium aparine (goose-grass)	20	0-20	11
Galium boreale (northern bedstraw)	1	0-1	5
Galium triflorum (sweetscented bedstraw)	3	0-10	21
Geranium species (geranium; crane's-bill)	1	0-1	16
Geranium richardsonii (white geranium)	1	0-1	5
Geum aleppicum (yellow avens)	1	0-1	5
Geum macrophyllum (larged-leaved avens)	2	0-3	11
Glycyrrhiza lepidota (American licorice)	6	0-10	11
Hackelia deflexa (nodding stickseed)	3	0-3	5
Hackelia floribunda (showy stickseed)	1	0-1	5
Heracleum lanatum (cow-parsnip)	3	0-3	21
Iris missouriensis (Rocky Mountain iris)	1	0-1	11
Lactuca serriola (prickly lettuce)	1	0-1	11
Lotus corniculatus (birds-foot trefoil)	3	0-3	5
Medicago sativa (alfalfa)	3	0-3	5
Melilotus alba (white sweet-clover)	20	0-20	5
Mentha arvensis (field mint)	1	0-1	5
Mertensia ciliata (mountain bluebell)	10	0-10	5
Osmorhiza chilensis (mountain sweet-cicely)	15	0-20	11
Penstemon species (penstemon)	1	0-1	5
Potentilla gracilis (slender cinquefoil)	1	0-1	11
Ranunculus cymbalaria (shore buttercup)	3	0-3	5
Rumex crispus (curly dock)	1	0-1	5
Senecio serra (tall butterweed)	3	0-3	5
Sisymbrium loeselii (Loeselii tumblemustard)	1	0-1	5
Smilacina racemosa (false spikenard)	3	0-3	5
Smilacina stellata (starry Solomon-plume)	12	0-80	53
Solidago canadensis (Canada goldenrod)	7	0-20	26
Solidago species (goldenrod)	12	0-20	11
Solidago missouriensis (Missouri goldenrod)	1	0-1	5
Solidago occidentalis (western goldenrod)	5	0-10	16
Taraxacum officinale (common dandelion)	6	0-20	42
Thalictrum species (meadowrue)	1	0-1	5
Thalictrum occidentale (western meadowrue)	3	0-3	5
Thelypodium integrifolium (entire-leaved thelypody)	3	0-3	5
Tragopogon dubius (goat's beard)	2	0-3	32
Trifolium species (clover)	20	0-20	5
Trifolium repens (white clover)	11	0-20	11
Typha latifolia (common cattail)	3	0-3	5
Urtica dioica (stinging nettle)	1	0-1	5
Vicia americana (American vetch)	1	0-1	5
Ferns and Allies			
Equisetum arvense (field horsetail)	2	0-3	21
Equisetum hyemale (common scouring-rush)	1	0-1	5
Equisetum laevigatum (smooth scouring-rush)	7	0-20	16
Polystichum munitum (common Christmas-fern)	3	0-3	5

SOILS

The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type in Idaho appears on a variety of locations across the landscape. On rocky slopes in V-shaped canyons, only a shallow layer of silt/loam 2.5-15 cm (1-6 in) deep may cover the underlying rocky substrate. The litter/duff layer, when present, is shallow, 5 cm (2 in) or less, and composed primarily of needles. Alluvial floodplains are characterized by silts, clays and sand often 60 cm (24 in) or deeper, overlying gravels, cobbles, or larger rocks. Hansen and others (1995) indicate that this habitat type is intolerant of frequent and prolonged flooding. However, the type is tolerant of periodic flooding and high water tables. Soils of this habitat type, typically Mollisols, Entisols (Fluvents), or Inceptisols, are generally well-drained and have a low water holding capacity (Hansen and others 1995). Coarse textured soils and moderate stream gradients provide an environment that produces rapid movement of well-aerated groundwater.

ADJACENT COMMUNITIES

Pseudotsuga menziesii (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), and *Acer grandidentat*um (bigtooth maple) communities may occupy adjacent uplands. *Artemisia tridentata* (big sagebrush) shrubland/grasslands are often present on plateaus adjacent to canyon sites, or at the edge of secondary floodplains. Adjacent moist site communities may be dominated by *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), or *Betula occidentalis* (water birch) types. Streamside zones are frequently vegetated with bulrushes or sedges. The *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type may be quite narrow in some locations and can convert to an upland community rapidly. Indicator species are vital for determining the often-abrupt transition from riparian to upland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low for stands in steep sided canyons, to moderate on sandy floodplains. Stands are typically very droughty, thereby reducing forage production. *Juniperus scopulorum* (Rocky Mountain juniper) is not very palatable to livestock, but young plants can be eliminated by grazing. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995). Long-term utilization may result in the loss of native species and subsequent replacement by weedy invaders.

Timber

Other than fence posts and pencils, *Juniperus scopulorum* (Rocky Mountain juniper) is considered primarily an ornamental species and generally unproductive for timber harvest activities (Hitchcock and Cronquist 1973).

Wildlife

Moose and deer use this type for forage and cover. Stands of the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type provide good to excellent structural diversity for both thermal and hiding cover. The berry-like cones of *Juniperus scopulorum* (Rocky Mountain juniper) are an excellent source of food for small mammals and birds, especially during the winter months (Arno and Hammerly 1984).

Fire

Fire potential is low to moderate in this type. Young juniper trees are easily killed by fire primarily because of their small size, thin bark, and compact crown (Fischer and Bradley 1987). As juniper ages, the bark thickens and the crown develops a bushy, open growth form. A hot fire can kill or severely damage a tree, but the same tree may survive a cool fire. Low, spreading branches can provide a route for fire to enter the crown. Often large junipers have survived a number of fires.

Soil Management and Rehabilitation Opportunities

Typically, these soils have weak structures, low organic matter contents, coarse textures, and thus, low water holding capacities. The high component of coarse textured fragments in the soil makes it relatively impervious to compaction. Other less drought resistant, more preferred, forage species associated with this habitat type can be easily disturbed with moderate animal use and can cause an increase of *Juniperus scopulorum* and invader species (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Although stands of this habitat type are often small, especially when occupying steep slopes, they may be developed for the purposes of camping and recreational fishing when growing on flat alluvial benches along rivers and streams. Additionally, they may provide excellent opportunities for nature study because of the diversity of wildlife associated with them. However, fire hazard is a serious consideration because even a light fire can kill stands of *Juniperus scopulorum* (Rocky Mountain juniper) (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been described for this type in Montana by Hansen and others (1995).

Picea/Cornus stolonifera Habitat Type
(Spruce/Red-Osier Dogwood Habitat Type)

PICEA/CORSTO (PICEA/COST4)
Number of Stands Sampled = 31

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Cornus stolonifera* (red-osier dogwood) habitat type is a minor type at mid to higher elevations in Idaho. Elevations of sampled sites range from 1,848 to 2,303 m (6,100 to 7,600 ft). This habitat type occupies flat alluvial terraces bordering mountain streams, or moist toe slopes in U- and V-shaped canyons. In some instances, it may inhabit bogs along lakeshores.

VEGETATION

Stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type are dominated by *Picea* species (spruce) in the upper canopy. *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine), and *Pseudotsuga menziesii* (Douglas fir) represent only minor components when present on site. The understory may be dominated by *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), and various willows, with *Ribes lacustre* (swamp currant) and *Alnus incana* (mountain alder) less well represented. Abundant herbaceous species include *Actaea rubra* (baneberry), *Thalictrum occidentale* (western meadowrue), *Heracleum lanatum* (cow-parsnip), *Senecio triangularis* (arrowleaf groundsel), and *Fragaria virginiana* (Virginia strawberry) (Table 9). Where the overstory is dense, the herbaceous component may be sparse and characterized by low vigor. Deadfall is often common on these sites. While overall species richness is relatively high within each of the canopy layers, covers and constancy for the individual species are actually low.

NOTE: The treatment of *Picea* species (spruce) in this classification, which terminates identification at the genus level, derives from the hybridization known to occur within this conifer. Most populations of *Picea* in Montana are hybrids derived from *Picea glauca* (white spruce) and *Picea engelmannii* (Engelmann spruce) (Daubenmire 1974, Habeck and Weaver 1969). The hybrid cross appears to predominate in Idaho forests as well. However, Pfister and others (1977) indicate that the extent of hybridization between *Picea glauca* (white spruce) and *Picea engelmannii* (Engelmann spruce) can be detected according to the size and shape of cone scales and should be noted due to its potential value for silvicultural purposes. A unique community of *Picea glauca* (white spruce) persists along the periphery of Henry's Lake in the northeast corner of Idaho adjacent to the Montana and Wyoming borders. This stand persists between bog/floating mat environments and appears as a relict community. It has been included within the *Picea* species (spruce) series because it keys to the *Picea/Cornus stolonifera* (red-osier dogwood) habitat type, but may represent a rare community.

Table 9. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Picea/Cornus stolonifera* (red-osier dogwood) habitat type (number = 3 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	33
Picea species (spruce)	15	0-20	67
Picea engelmannii (Engelmann spruce)	60	0-60	33
Pseudotsuga menziesii (Douglas fir)	1	0-1	33
Shrubs			
Alnus incana (mountain alder)	25	0-30	67
Betula occidentalis (water birch)	1	0-1	33
Cornus stolonifera (red-osier dogwood)	43	20-70	100
Lonicera involucrata (twin-berry)	20	0-20	33
Pachistima myrsinites (mountain-boxwood)	10	0-10	33
Ribes species (currant; gooseberry)	15	0-20	67
Ribes hudsonianum (stinking currant)	7	1-10	100
Ribes lacustre (swamp currant)	3	0-3	33
Rubus idaeus (red raspberry)	1	0-1	33
Rubus leucodermis (blackcap)	10	0-10	33
Rubus parviflorus (thimbleberry)	1	0-1	33
Salix boothii (Booth willow)	6	0-10	67
Salix drummondiana (Drummond willow)	26	0-50	67
Sambucus racemosa (red elderberry)	1	0-1	33
Sorbus scopulina (Cascade mountain-ash)	1	0-1	33
Spiraea betulifolia (shiny-leaf spiraea)	3	0-3	33
Graminoids			
Agrostis stolonifera (redtop)	3	0-3	33
Bromus carinatus (mountain brome)	10	0-10	33
Calamagrostis canadensis (bluejoint reedgrass)	50	0-70	67
Carex brevior (short-beaked sedge)	1	0-1	33
Carex geyeri (elk sedge)	1	0-1	33
Carex limosa (mud sedge)	1	0-1	33
Deschampsia cespitosa (tufted hairgrass)	10	0-10	33
Elymus cinereus (basin wildrye)	1	0-1	33
Glyceria striata (fowl mannagrass)	10	0-10	33
Poa pratensis (Kentucky bluegrass)	3	0-3	33
Forbs			
Actaea rubra (baneberry)	10	0-10	33
Aster foliaceus (leafy aster)	10	0-10	33
Aster occidentalis (western aster)	20	0-20	33
Circaea alpina (Enchanter's nightshade)	1	0-1	33
Cirsium arvense (Canada thistle)	1	0-1	33
Collinsia parviflora (small-flowered blue-eyed Mary)	1	0-1	33
Epilobium angustifolium (fireweed)	7	0-10	67
Fragaria virginiana (Virginia strawberry)	1	0-1	33
Galium triflorum (sweetscented bedstraw)	2	1-3	100
Geranium viscosissimum (sticky geranium)	3	0-3	33
Geum macrophyllum (larged-leaved avens)	4	1-10	100
Heracleum lanatum (cow-parsnip)	18	3-40	100
Ligusticum tenuifolium (slender-leafed licorice-root)	1	0-1	33
Mentha arvensis (field mint)	10	0-10	33
Mertensia ciliata (mountain bluebell)	1	0-1	33
Mimulus guttatus (common monkey-flower)	1	0-1	33

Table 9 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Osmorhiza chilensis (mountain sweet-cicely)	3	0-3	33
Osmorhiza occidentalis (western sweet-cicely)	2	0-3	67
Prenanthes sagittata (arrow-leaf rattlesnake-root)	20	0-20	33
Pyrola asarifolia (pink wintergreen)	3	0-3	33
Pyrola elliptica (white wintergreen)	1	0-1	33
Rudbeckia occidentalis (black head)	3	0-3	33
Saxifraga arguta (brook saxifrage)	16	0-30	67
Senecio triangularis (arrowleaf groundsel)	1	0-1	67
Smilacina stellata (starry Solomon-plume)	10	0-10	67
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	33
Taraxacum officinale (common dandelion)	1	0-1	33
Thalictrum occidentale (western meadowrue)	1	0-1	67
Trillium ovatum (white trillium)	1	0-1	33
Urtica dioica (stinging nettle)	1	0-1	67
Viola species (violet)	20	0-20	67
Ferns and Allies			
Athyrium filix-femina (ladyfern)	1	0-1	33
Equisetum arvense (field horsetail)	8	3-10	100
Equisetum hyemale (common scouring-rush)	10	0-10	33
Equisetum laevigatum (smooth scouring-rush)	1	0-1	33
Equisetum scirpoides (sedgelike horsetail)	1	0-1	33

SUCCESSIONAL INFORMATION

Pseudotsuga menziesii (Douglas fir), *Populus tremuloides* (quaking aspen), and *Populus trichocarpa* (black cottonwood) appear to act as seral stages within the *Picea* species (spruce) successional pathways. On wetter sites, willows may represent a major component, if not the dominant vegetation, preceding the eventual occupation by *Picea* species (spruce). Hansen and others (1995) indicate that *Picea* species (spruce) reestablishes quickly on disturbed sites but assumes dominance slowly. This pattern may result in mixed forested stands dominated by other tree species in which the *Picea* species (spruce) cover varies dramatically (Table 10).

Table 10. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of *Picea/Cornus stolonifera* (red-osier dogwood) habitat type (number = 28 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	2	0-3	25
Juniperus scopulorum (Rocky Mountain juniper)	4	0-10	11
Larix occidentalis (western larch)	1	0-1	14
Picea species (spruce)	36	3-98	100
Pinus contorta (lodgepole pine)	38	0-80	21
Pinus ponderosa (ponderosa pine)	6	0-20	21
Populus angustifolia (narrowleaf cottonwood)	3	0-3	4
Populus tremuloides (quaking aspen)	30	0-80	32
Populus trichocarpa (black cottonwood)	14	0-50	29
Pseudotsuga menziesii (Douglas fir)	12	0-30	36
Shrubs			
Acer glabrum (Rocky Mountain maple)	9	0-20	21
Alnus incana (mountain alder)	19	0-60	18
Amelanchier alnifolia (western serviceberry)	3	0-20	57
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	11
Berberis repens (creeping Oregongrape)	2	0-3	32
Betula glandulosa (bog birch)	12	0-20	7
Betula occidentalis (water birch)	25	0-60	25
Chimaphila umbellata (common prince's-pine)	2	0-3	7
Clematis ligusticifolia (western virgins-bower)	3	0-3	4
Clematis occidentalis (Columbia clematis)	1	0-1	14
Cornus canadensis (bunchberry)	8	0-20	32
Cornus stolonifera (red-osier dogwood)	8	0-40	82
Elaeagnus commutata (silverberry)	50	0-50	4
Juniperus communis (common juniper)	1	0-1	7
Linnaea borealis (twinflower)	16	0-40	43
Lonicera involucrata (twin-berry)	2	0-3	29
Lonicera utahensis (Utah honeysuckle)	1	0-1	14
Menziesia ferruginea (fool's huckleberry)	1	0-1	4
Pachistima myrsinites (mountain-boxwood)	1	0-1	7
Physocarpus malvaceus (mallow ninebark)	1	0-1	4
Potentilla fruticosa (shrubby cinquefoil)	5	0-10	11
Prunus virginiana (common chokecherry)	12	0-40	14
Rhamnus alnifolia (alder buckthorn)	7	0-20	29
Ribes species (currant; gooseberry)	2	0-3	11

Table 10 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Ribes irriguum (Idaho gooseberry)	1	0-1	7
Ribes lacustre (swamp currant)	3	0-10	46
Ribes montigenum (Mountain gooseberry)	1	0-1	4
Rosa acicularis (prickly rose)	3	0-20	36
Rosa species (rose)	8	0-40	21
Rosa gymnocarpa (baldhip rose)	2	0-3	14
Rosa woodsii (woods rose)	15	0-40	11
Rubus idaeus (red raspberry)	2	0-3	14
Rubus laciniatus (evergreen blackberry)	3	0-3	4
Rubus parviflorus (thimbleberry)	10	0-40	32
Salix bebbiana (Bebb willow)	7	0-20	14
Salix boothii (Booth willow)	10	0-20	18
Salix candida (hoary willow)	2	0-3	7
Salix drummondiana (Drummond willow)	6	0-10	7
Salix exigua (sandbar willow)	12	0-20	7
Salix geyeriana (Geyer willow)	12	0-20	7
Salix species (willows)	1	0-1	11
Salix lasiandra (Pacific willow)	1	0-1	4
Salix planifolia (planeleaf willow)	30	0-30	4
Salix scouleriana (Scouler willow)	3	0-3	7
Salix tweedyi (Tweedy's willow)	10	0-10	4
Sambucus cerulea (blue elderberry)	1	0-1	4
Sambucus racemosa (red elderberry)	1	0-1	4
Sarcobatus vermiculatus (black greasewood)	10	0-10	4
Shepherdia canadensis (Canada buffaloberry)	6	0-20	36
Sorbus scopulina (Cascade mountain-ash)	1	0-1	7
Spiraea betulifolia (shiny-leaf spiraea)	12	0-40	29
Symphoricarpos albus (common snowberry)	16	0-60	64
Symphoricarpos occidentalis (western snowberry)	32	0-60	7
Taxus brevifolia (Pacific yew)	1	0-1	4
Vaccinium cespitosum (dwarf huckleberry)	1	0-1	4
Vaccinium globulare (globe huckleberry)	1	0-1	4
Vaccinium membranaceum (big huckleberry)	1	0-1	4
Vaccinium scoparium (whortleberry)	1	0-1	4
Graminoids			
Agropyron species (wheatgrass)	3	0-3	4
Agropyron repens (quackgrass)	1	0-1	7
Agrostis stolonifera (redtop)	9	0-30	14
Agrostis tenuis (colonial bentgrass)	20	0-20	4
Bromus carinatus (mountain brome)	1	0-1	7
Bromus ciliatus (fringed brome)	4	0-10	11
Bromus inermis (smooth brome)	3	0-3	4
Bromus vulgaris (Columbia brome)	2	0-3	21
Calamagrostis canadensis (bluejoint reedgrass)	3	0-10	18
Calamagrostis rubescens (pinegrass)	3	0-10	18
Calamagrostis stricta (narrow-spiked reedgrass)	11	0-20	11
Carex aquatilis (water sedge)	30	0-30	4
Carex atherodes (awned sedge)	1	0-1	4
Carex canescens (gray sedge)	1	0-1	4
Carex concinnoides (northwestern sedge)	1	0-1	4
Carex deweyana (Dewey's sedge)	3	0-3	4
Carex disperma (soft-leaved sedge)	20	0-20	7
Carex species (sedges)	3	0-10	21
Carex raynoldsii (Raynolds' sedge)	1	0-1	4
Carex rossii (Ross sedge)	20	0-20	4
Carex rupestris (curly sedge)	20	0-20	4
Carex spectabilis (showy sedge)	1	0-1	4
Carex vesicaria (inflated sedge)	20	0-20	4
Cinna latifolia (drooping woodreed)	32	0-60	7
Dactylis glomerata (orchard-grass)	1	0-1	4
Danthonia intermedia (timber oatgrass)	1	0-1	4
Danthonia spicata (poverty oatgrass)	1	0-1	4
Elymus canadensis (Canada wildrye)	15	0-20	7
Elymus cinereus (basin wildrye)	2	0-3	7
Elymus glaucus (blue wildrye)	10	0-60	39
Festuca occidentalis (western fescue)	1	0-1	7
Festuca scabrella (rough fescue)	20	0-20	4
Glyceria grandis (American mannagrass)	1	0-1	4
Glyceria striata (fowl mannagrass)	3	0-3	7
Grass annual (Annual Grass)	3	0-3	4
Juncus balticus (Baltic rush)	2	0-3	11
Luzula campestris (field woodrush)	1	0-1	4
Melica subulata (Alaska oniongrass)	2	0-3	11
Oryzopsis asperifolia (roughleaf ricegrass)	5	0-20	18
Phleum pratense (common timothy)	5	0-20	21
Poa palustris (fowl bluegrass)	10	0-10	7
Poa pratensis (Kentucky bluegrass)	8	0-10	14
Poa species (bluegrass)	3	0-3	4
Schizachne purpurascens (false melic)	1	0-1	7
Trisetum wolfii (Wolf's trisetum)	1	0-1	4
Forbs			
Achillea millefolium (common yarrow)	1	0-3	25
Aconitum columbianum (Columbian monkshood)	1	0-1	4
Actaea rubra (baneberry)	4	0-20	43
Adenocaulon bicolor (trail-plant)	1	0-1	14
Agoseris aurantiaca (orange agoseris)	1	0-1	4
Allium brevistylum (short-style onion)	4	0-10	11

Table 10 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Allium species (onion)	1	0-1	4
Anaphalis margaritacea (common pearly-everlasting)	1	0-1	4
Anemone piperi (Piper's anemone)	1	0-1	7
Angelica arguta (sharptooth angelica)	2	0-3	36
Antennaria racemosa (raceme pussy-toes)	1	0-1	4
Aralia nudicaulis (wild sarsaparilla)	12	0-40	21
Arenaria lateriflora (bluntleaf sandwort)	1	0-1	4
Arenaria macrophylla (bigleaf sandwort)	1	0-1	4
Arnica chamissonis (meadow arnica)	1	0-1	4
Arnica cordifolia (heart-leaf arnica)	11	0-20	11
Arnica species (arnica)	10	0-10	4
Arnica latifolia (broadleaf arnica)	11	0-20	14
Artemisia ludoviciana (prairie sagewort)	1	0-1	7
Aster conspicuus (showy aster)	1	0-1	11
Aster engelmannii (Engelmann's aster)	1	0-1	7
Aster species (aster)	2	0-3	7
Aster falcatus (white-prairie aster)	1	0-1	4
Aster foliaceus (leafy aster)	1	0-1	4
Aster hesperius (marsh aster)	1	0-1	4
Aster laevis (smooth aster)	1	0-3	21
Astragalus miser (weedy milk-vetch)	7	0-10	7
Aster modestus (few-flowered aster)	1	0-1	4
Aster occidentalis (western aster)	10	0-20	11
Cacalia plantaginea (Indian plantain)	3	0-3	4
Camassia quamash (common camas)	1	0-1	4
Campanula rotundifolia (lady's-thimble)	1	0-1	11
Cardamine pensylvanica (Pennsylvania bittercress)	1	0-1	4
Castilleja hispida (harsh paintbrush)	1	0-1	4
Castilleja miniata (scarlet paintbrush)	1	0-1	11
Cerastium arvense (field chickweed)	1	0-1	4
Cicuta maculata (spotted water-hemlock)	3	0-3	4
Circaea alpina (Enchanter's nightshade)	1	0-1	7
Cirsium arvense (Canada thistle)	2	0-3	7
Cirsium scariosum (elk thistle)	3	0-3	4
Clintonia uniflora (queen's cup)	7	0-20	11
Corallorhiza maculata (spotted coral-root)	1	0-1	4
Corallorhiza striata (striped coral-root)	7	0-20	11
Corallorhiza trifida (yellow coral-root)	1	0-1	4
Disporum hookeri (hooker fairy-bell)	1	0-1	4
Disporum species (fairy-bell)	3	0-3	4
Disporum trachycarpum (wartberry fairy-bell)	1	0-3	18
Dodecatheon conjugens (slimpod shooting star)	1	0-1	4
Dodecatheon jeffreyi (tall mountain shooting star)	1	0-1	7
Epilobium angustifolium (fireweed)	1	0-3	18
Epilobium ciliatum (common willow-herb)	1	0-1	4
Erigeron peregrinus (subalpine daisy)	1	0-1	4
Erythronium grandiflorum (glacier-lily)	7	0-20	14
Fragaria species (strawberry)	1	0-1	4
Fragaria vesca (woods strawberry)	1	0-1	11
Fragaria virginiana (Virginia strawberry)	5	0-30	64
Galium aparine (goose-grass)	1	0-1	4
Galium boreale (northern bedstraw)	1	0-3	54
Galium trifidum (small bedstraw)	1	0-1	7
Galium triflorum (sweetscented bedstraw)	4	0-40	54
Gentiana affinis (pleated gentian)	1	0-1	7
Geranium richardsonii (white geranium)	2	0-3	21
Geranium viscosissimum (sticky geranium)	5	0-10	21
Geum macrophyllum (larged-leaved avens)	1	0-3	25
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-1	18
Habenaria dilatata (white orchis)	1	0-1	7
Habenaria hyperborea (northern green bog-orchid)	1	0-1	7
Habenaria orbiculata (large round-leaved Rein-orchid)	1	0-1	4
Habenaria saccata (slender bog-orchid)	1	0-1	4
Hedysarum sulphurescens (yellow hedysarum)	2	0-3	7
Heracleum lanatum (cow-parsnip)	3	0-20	32
Hieracium umbellatum (narrow-leaved hawkweed)	1	0-1	4
Lathyrus ochroleucus (cream-flowered peavine)	1	0-1	11
Ligusticum filicinum (fern-leaf lovage)	1	0-1	4
Ligusticum tenuifolium (slender-leafed licorice-root)	3	0-3	4
Listera caurina (western twayblade)	1	0-1	4
Lomatium grayi (Gray's desert-parsley)	20	0-20	4
Medicago lupulina (black medic)	1	0-1	4
Medicago sativa (alfalfa)	1	0-1	4
Melilotus alba (white sweet-clover)	10	0-10	4

Table 10 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Melilotus officinalis (yellow sweet-clover)	1	0-1	4
Mertensia ciliata (mountain bluebell)	1	0-1	11
Mitella species (mitrewort)	1	0-1	4
Mitella nuda (bare-stemed mitrewort)	1	0-1	14
Mitella pentandra (five-stamened mitrewort)	6	0-10	7
Osmorhiza chilensis (mountain sweet-cicely)	6	0-20	46
Osmorhiza depauperata (blunt-fruit sweet-cicely)	1	0-1	4
Osmorhiza occidentalis (western sweet-cicely)	7	0-20	11
Osmorhiza purpurea (purple sweet-cicely)	3	0-3	4
Parnassia fimbriata (fringed grass-of-parnassus)	10	0-10	4
Pedicularis bracteosa (bracted lousewort)	8	0-20	21
Pedicularis contorta (coiled-beak lousewort)	1	0-1	4
Pedicularis groenlandica (elephant's head)	1	0-1	4
Penstemon procerus (small-flowered penstemon)	1	0-1	4
Potentilla gracilis (slender cinquefoil)	1	0-1	7
Prunella vulgaris (self-heal)	1	0-1	11
Pyrola asarifolia (pink wintergreen)	1	0-1	21
Pyrola chlorantha (green wintergreen)	1	0-1	7
Pyrola minor (snowline pyrola)	1	0-1	4
Pyrola secunda (one-sided wintergreen)	1	0-1	18
Ranunculus gmelinii (small yellow water-buttercup)	1	0-1	4
Ranunculus species (buttercup)	10	0-10	4
Ranunculus uncinatus (little buttercup)	1	0-1	7
Rubus pubescens (dwarf red blackberry)	4	0-10	11
Rudbeckia species (rudbeckia)	1	0-1	4
Rudbeckia occidentalis (black head)	12	0-20	7
Sanicula marilandica (black snake-root)	1	0-1	4
Saxifraga arguta (brook saxifrage)	16	0-30	7
Senecio crassulus (thick-leaved groundsel)	20	0-20	4
Senecio foetidus (sweet-marsh butterweed)	3	0-3	4
Senecio pseudaureus (streambank groundsel)	2	0-10	32
Senecio triangularis (arrowleaf groundsel)	3	0-10	21

Table 10 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Silene species (campion; catchfly)	1	0-1	4
Silene menziesii (Menzies' silene)	1	0-1	7
Smilacina racemosa (false spikenard)	1	0-3	25
Smilacina stellata (starry Solomon-plume)	3	0-20	82
Solidago canadensis (Canada goldenrod)	6	0-10	7
Solidago species (goldenrod)	3	0-3	4
Solidago missouriensis (Missouri goldenrod)	3	0-3	4
Solidago multiradiata (Northern goldenrod)	1	0-1	4
Solidago speciosa (showy-wand goldenrod)	10	0-10	4
Sonchus species (sow-thistle)	3	0-3	4
Stachys palustris (swamp hedge-nettle)	1	0-1	4
Stenanthium occidentale (western stenanthium)	1	0-1	4
Streptopus amplexifolius (clasping-leaved twisted-stalk)	3	0-10	14
Taraxacum officinale (common dandelion)	6	0-20	36
Thalictrum occidentale (western meadowrue)	10	0-60	57
Tiarella trifoliata (trefoil foamflower)	2	0-3	7
Tragopogon dubius (goat's beard)	1	0-1	4
Trifolium agrarium (yellow clover)	1	0-1	4
Trifolium dubium (least hop clover)	10	0-10	4
Trifolium hybridum (alsike clover)	10	0-10	4
Trillium ovatum (white trillium)	1	0-1	14
Trifolium repens (white clover)	9	0-20	14
Urtica dioica (stinging nettle)	1	0-1	11
Valeriana dioica (northern valerian)	3	0-3	4
Valeriana sitchensis (sitka valerian)	1	0-1	11
Veronica americana (American speedwell)	10	0-10	7
Veratrum viride (green false hellebore)	11	0-20	7
Vicia americana (American vetch)	1	0-3	25
Vicia species (vetch)	1	0-1	4
Viola adunca (Hook violet)	1	0-1	7
Viola canadensis (Canada violet)	8	0-40	25
Viola glabella (pioneer violet)	1	0-1	4
Viola species (violet)	1	0-1	4
Viola nephrophylla (northern bog violet)	3	0-3	7
Viola orbiculata (round-leaved violet)	6	0-20	14
Xerophyllum tenax (beargrass)	1	0-1	4
Ferns and Allies			
Athyrium filix-femina (ladyfern)	1	0-3	18

Table 10 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Botrychium virginianum (Virginia grape-fern)	1	0-1	4
Equisetum arvense (field horsetail)	6	0-20	32
Equisetum hyemale (common scouring-rush)	5	0-10	18
Equisetum species (horsetail; scouring-rush)	3	0-3	4
Equisetum laevigatum (smooth scouring-rush)	3	0-3	4
Equisetum palustre (marsh horsetail)	15	0-20	7
Equisetum pratense (meadow horsetail)	1	0-1	11
Equisetum scirpoides (sedgelike horsetail)	1	0-1	4
Gymnocarpium dryopteris (oak-fern)	1	0-1	4

SOILS

Rich, black, organic soils, indicative of Mollisols (Hansen and others 1995), may be 60 cm (24 in) or more deep. Due to suspected year round surface and subsurface flows, these soils may exhibit gleying, the reduction of iron under predominantly anaerobic conditions producing a bluish-green cast, or mottling, the presence of brown, yellow or reddish flecks of concentrated iron formed through alternating oxidizing/reducing conditions due to fluctuating water tables (Buol and others 1989). Soil textures are predominantly loamy silts and silts, but may exhibit a high component of decomposing woody debris. The presence of the organic material and coarser fragments may partially be the result of alluvial transport. Underlying substrates often consist of alluvial cobbles, gravels, and sands. A litter/duff layer up to 4 cm (1.5) inches in depth, composed predominantly of needles and twigs, may carpet the ground in some locations.

ADJACENT COMMUNITIES

The *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type occupies an intermediate position along a moisture gradient within the *Picea* species (spruce) series. The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type indicates saturated or wetter conditions while the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type occurs on drier sites. Adjacent wetter communities are dominated by sedges, willows, and *Populus tremuloides* (quaking aspen). *Picea* species (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Pinus contorta* (lodgepole pine) occupy upland slopes.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is low to moderate where the overstory is dense, and tends to limit forage availability for livestock. Where stands are more open, especially under late seral conditions, lush undergrowth may provide excellent forage. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high. Seasonally wet conditions, or year round saturation where this type is located adjacent to springs or seeps, may require special restrictions to prevent soil compaction (see the Soil Management and Rehabilitation Opportunities section) (Hansen and others 1995).

Timber

Timber productivity ranges from moderate to high. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* species (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir) and *Pinus contorta* (lodgepole pine) along with *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural treatment in this habitat type (Hansen and others 1995).

Wildlife

Hansen and others (1995) indicate that deer and elk appear to use this type as winter range. Some of the broad, flat mountain valleys associated with this type may be prime yearlong moose habitat. Some sites may show sustained heavy use by moose and elk. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by wildlife and livestock. Its utilization is a direct indication of past and current use levels.

Fisheries

Those stands of the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type adjacent to streams provide hiding, thermal cover, debris recruitment, and streambank stability for fish. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage.

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, streamside locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Similar communities have been described for eastern Idaho and western Wyoming (Youngblood and others 1985b), for Utah and southeastern Idaho (Padgett and others 1989), and for Montana (Hansen and other 1995).

Picea/Equisetum arvense Habitat Type
(Spruce/Field Horsetail Habitat Type)

PICEA/EQUARV (PICEA/EQAR)
Number of Stands Sampled = 14

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Equisetum arvense* (spruce/field horsetail) habitat type is an incidental type at mid to higher elevations in the mountains of Idaho. Elevations of sampled sites range from 1848 to 2,303 m (6,100 to 7,600 ft). This type characteristically occurs on level sites with pooled water, or where soils are saturated near the surface. It also occurs on gentle toeslopes, seeps, stream terraces, and on high elevation basins adjacent to small lakes, fens, and wet meadows having low gradient meandering streams. Boundaries with adjacent types are often distinct.

VEGETATION

Late-seral *Picea* species (spruce) forests typically develop a closed, overstory canopy; however, sporadic openings occur as a result of windfall and deadfall trees. *Abies lasiocarpa* (subalpine fir) and *Populus tremuloides* (quaking aspen) are occasionally present on drier microsites. Shrub species richness is high but their coverage is low. Affiliated shrub species include *Lonicera involucrata* (twin-berry) and *Cornus stolonifera* (red-osier dogwood). The understory is dominated by *Equisetum arvense* (field horsetail), although a diversity of other herbaceous species, such as *Smilacina stellata* (starry Solomon-plume), *Galium triflorum* (sweetscented bedstraw), and *Osmorhiza chilensis* (mountain sweet-cicely), are often present, although with minimal coverages. The micro-relief occasionally generated by root crown hummocks and windthrow mounds accounts for high species richness with a mixture of upland and wetland species (Table 11).

Table 11. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Picea/Equisetum arvense* (spruce/field horsetail) habitat type (number = 9 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	11
Larix occidentalis (western larch)	1	0-1	11
Picea species (spruce)	66	0-80	89
Picea engelmannii (Engelmann spruce)	70	0-70	11
Pinus contorta (lodgepole pine)	2	0-3	22
Populus tremuloides (quaking aspen)	2	0-3	33
Populus trichocarpa (black cottonwood)	1	0-1	11
Pseudotsuga menziesii (Douglas fir)	2	0-3	22
Shrubs			
Acer species (maple)	1	0-1	11
Amelanchier alnifolia (western serviceberry)	1	0-1	22
Berberis repens (creeping Oregongrape)	1	0-1	33
Cornus canadensis (bunchberry)	3	0-3	11
Cornus stolonifera (red-osier dogwood)	5	0-10	44
Linnaea borealis (twinflower)	2	0-3	22
Lonicera involucrata (twin-berry)	2	0-3	67
Pachistima myrsinites (mountain-boxwood)	1	0-1	11
Rhamnus alnifolia (alder buckthorn)	3	0-3	11
Ribes species (currant; gooseberry)	1	0-1	11

Table 11 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Ribes hudsonianum (stinking currant)	3	0-3	11
Ribes lacustre (swamp currant)	2	0-3	22
Rosa acicularis (prickly rose)	2	0-3	33
Rosa woodsii (woods rose)	2	0-3	33
Rubus idaeus (red raspberry)	1	0-1	11
Salix drummondiana (Drummond willow)	50	0-50	11
Salix species (willows)	1	0-1	22
Salix scouleriana (Scouler willow)	1	0-1	11
Spiraea betulifolia (shiny-leaf spiraea)	3	0-3	11
Symphoricarpos albus (common snowberry)	2	0-3	44
Symphoricarpos occidentalis (western snowberry)	1	0-1	11
Graminoids			
Agrostis exarata (spike bentgrass)	1	0-1	11
Agropyron species (wheatgrass)	3	0-3	11
Agrostis scabra (tickle-grass)	1	0-1	11
Agrostis stolonifera (redtop)	2	0-3	22
Agrostis thurberiana (thurber bentgrass)	3	0-3	11
Bromus ciliatus (fringed brome)	1	0-1	33
Bromus vulgaris (Columbia brome)	1	0-1	22
Calamagrostis canadensis (bluejoint reedgrass)	27	0-40	33
Calamagrostis rubescens (pinegrass)	2	0-3	22
Carex brevior (short-beaked sedge)	3	0-3	11
Carex canescens (gray sedge)	3	0-3	11
Carex disperma (soft-leaved sedge)	1	0-1	11
Carex pachystachya (thick-headed sedge)	1	0-1	11
Carex rossii (Ross sedge)	1	0-1	11
Carex rostrata (beaked sedge)	17	0-30	22
Cinna latifolia (drooping woodreed)	1	0-1	22
Elymus cinereus (basin wildrye)	1	0-1	11
Elymus glaucus (blue wildrye)	6	0-10	22
Glyceria elata (tall mannagrass)	1	0-1	11
Glyceria striata (fowl mannagrass)	2	0-3	22
Luzula parviflora (small-flowered woodrush)	1	0-1	11
Poa pratensis (Kentucky bluegrass)	1	0-1	11
Forbs			
Actaea rubra (baneberry)	2	0-3	44
Allium species (onion)	1	0-1	11
Angelica arguta (sharptooth angelica)	1	0-1	11
Aralia nudicaulis (wild sarsaparilla)	20	0-20	11
Arenaria lateriflora (bluntleaf sandwort)	1	0-1	11
Arnica cordifolia (heart-leaf arnica)	1	0-1	22
Arnica latifolia (broadleaf arnica)	3	0-3	11
Aster species (aster)	1	0-1	11
Aster foliaceus (leafy aster)	9	0-20	33
Aster occidentalis (western aster)	3	0-3	11

Table 11 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Aster perelegans (elegant aster)	1	0-1	11
Cirsium arvense (Canada thistle)	4	0-10	33
Cirsium foliosum (elk thistle)	1	0-1	11
Cirsium undulatum (wavy-leaved thistle)	1	0-1	11
Epilobium alpinum (alpine willow-herb)	1	0-1	11
Epilobium angustifolium (fireweed)	1	0-3	67
Epilobium glaberrimum (smooth willow-herb)	1	0-1	11
Erigeron peregrinus (subalpine daisy)	1	0-1	11
Erigeron speciosus (showy fleabane)	1	0-1	11
Fragaria virginiana (Virginia strawberry)	1	0-1	22
Galium boreale (northern bedstraw)	1	0-1	33
Galium trifidum (small bedstraw)	1	0-1	11
Galium triflorum (sweetscented bedstraw)	2	0-3	56
Geranium richardsonii (white geranium)	2	0-3	33
Geranium viscosissimum (sticky geranium)	3	0-3	11
Geum macrophyllum (larged-leaved avens)	1	0-1	44
Geum triflorum (old man's whiskers)	1	0-1	11
Habenaria obtusata (blunt-leaf Rein-orchid)	1	0-1	11
Heracleum lanatum (cow-parsnip)	1	0-1	22
Mertensia ciliata (mountain bluebell)	3	0-3	11
Mitella species (mitrewort)	1	0-1	11
Osmorhiza chilensis (mountain sweet-cicely)	2	0-3	33
Osmorhiza occidentalis (western sweet-cicely)	3	0-3	11
Potentilla gracilis (slender cinquefoil)	1	0-1	11
Pyrola asarifolia (pink wintergreen)	1	0-1	33
Pyrola chlorantha (green wintergreen)	1	0-1	11
Pyrola elliptica (white wintergreen)	1	0-1	11
Pyrola species (wintergreen)	1	0-1	11
Pyrola secunda (one-sided wintergreen)	1	0-1	33
Pyrola uniflora (woodnymph)	1	0-1	22
Ranunculus uncinatus (little buttercup)	1	0-1	11
Rubus pubescens (dwarf red blackberry)	3	0-3	11
Senecio pseudaureus (streambank groundsel)	1	0-1	44
Smilacina racemosa (false spikenard)	1	0-1	11
Smilacina stellata (starry Solomon-plume)	5	0-20	67
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	33

Table 11 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Taraxacum officinale (common dandelion)	1	0-1	22
Thalictrum fendleri (Fendler's meadowrue)	3	0-3	11
Thalictrum occidentale (western meadowrue)	2	0-3	33
Veronica americana (American speedwell)	1	0-1	22
Vicia species (vetch)	1	0-1	11
Viola adunca (Hook violet)	1	0-1	33
Viola canadensis (Canada violet)	1	0-1	22
Viola species (violet)	1	0-1	22
Viola nuttallii (yellow prairie violet)	10	0-10	11
Viola orbiculata (round-leaved violet)	1	0-1	11
Ferns and Allies			
Equisetum arvense (field horsetail)	54	30-90	100
Equisetum laevigatum (smooth scouring-rush)	1	0-1	11

SUCCESSIONAL INFORMATION

Populus trichocarpa (black cottonwood) and *Pinus contorta* (lodgepole pine) may be abundant in seral stands, although seedling and sapling *Picea* (spruce) are common in the understory. As sites become drier, the conditions may shift to favor the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type or the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type. The *Populus tremuloides/Equisetum arvense* (quaking aspen/field horsetail) community type described by Youngblood and Mueggler (1981) is considered a seral stage of this habitat type.

Table 12. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Picea/Equisetum arvense* (spruce/field horsetail) habitat type (number = 5 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	20
Picea species (spruce)	54	10-80	100
Pinus contorta (lodgepole pine)	12	0-20	40
Populus tremuloides (quaking aspen)	1	0-1	20
Populus trichocarpa (black cottonwood)	20	0-20	20
Pseudotsuga menziesii (Douglas fir)	1	0-1	20
Shrubs			
Alnus incana (mountain alder)	10	0-10	20
Alnus species (alder)	20	0-20	20
Betula occidentalis (water birch)	20	0-20	20
Cornus stolonifera (red-osier dogwood)	2	0-3	60
Juniperus communis (common juniper)	1	0-1	20
Lonicera involucrata (twin-berry)	2	0-3	40
Rhamnus alnifolia (alder buckthorn)	1	0-1	20
Ribes hudsonianum (stinking currant)	1	0-1	20
Ribes lacustre (swamp currant)	2	0-3	40
Rosa acicularis (prickly rose)	1	0-1	60
Rosa woodsii (woods rose)	20	0-20	20
Salix bebbiana (Bebb willow)	20	0-20	20
Salix species (willows)	1	0-1	40
Spiraea betulifolia (shiny-leaf spiraea)	1	0-1	20
Symphoricarpos albus (common snowberry)	1	0-1	60
Vaccinium scoparium (whortleberry)	1	0-1	20
Graminoids			
Agrostis stolonifera (redtop)	30	0-30	20
Alopecurus alpinus (alpine foxtail)	1	0-1	20
Bromus carinatus (mountain brome)	1	0-1	20
Bromus mollis (soft brome)	1	0-1	20
Calamagrostis canadensis (bluejoint reedgrass)	21	0-40	40
Carex capillaris (hair sedge)	3	0-3	20
Carex disperma (soft-leaved sedge)	1	0-1	20
Carex pachystachya (thick-headed sedge)	1	0-1	20
Carex rossii (Ross sedge)	1	0-1	20
Carex rostrata (beaked sedge)	1	0-1	40
Elymus glaucus (blue wildrye)	1	0-1	20
Glyceria elata (tall mannagrass)	1	0-1	20
Luzula parviflora (small-flowered woodrush)	1	0-1	20
Melica subulata (Alaska oniongrass)	1	0-1	20
Poa species (bluegrass)	1	0-1	20
Trisetum wolfii (Wolf's trisetum)	20	0-20	20
Forbs			
Actaea rubra (baneberry)	1	0-1	40
Angelica arguta (sharptooth angelica)	2	0-3	40
Antennaria neglecta (field pussy-toes)	1	0-1	20
Arnica cordifolia (heart-leaf arnica)	1	0-1	20
Aster conspicuus (showy aster)	1	0-1	20
Aster species (aster)	1	0-1	40
Aster foliaceus (leafy aster)	3	0-3	20
Aster modestus (few-flowered aster)	10	0-10	20
Astragalus species (milk-vetch; orophaca)	1	0-1	20
Cirsium arvense (Canada thistle)	3	0-3	20
Cirsium vulgare (bull thistle)	1	0-1	20
Dodecatheon jeffreyi (tall mountain shooting star)	1	0-1	20
Epilobium alpinum (alpine willow-herb)	3	0-3	20

Table 12 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Epilobium angustifolium (fireweed)	1	0-1	20
Epilobium ciliatum (common willow-herb)	1	0-1	20
Fragaria virginiana (Virginia strawberry)	1	0-1	60
Galium boreale (northern bedstraw)	1	0-1	20
Galium triflorum (sweetscented bedstraw)	1	0-1	60
Geranium richardsonii (white geranium)	2	0-3	60
Geum macrophyllum (larged-leaved avens)	2	0-3	40
Geum rivale (water avens)	1	0-1	20
Geum triflorum (old man's whiskers)	1	0-1	20
Habenaria dilatata (white orchis)	1	0-1	20
Heracleum lanatum (cow-parsnip)	1	0-1	20
Mentha arvensis (field mint)	1	0-1	20
Mitella pentandra (five-stamened mitrewort)	2	0-3	40
Osmorhiza chilensis (mountain sweet-cicely)	1	0-1	60
Parnassia fimbriata (fringed grass-of-parnassus)	1	0-1	20
Potentilla gracilis (slender cinquefoil)	1	0-1	20
Pyrola asarifolia (pink wintergreen)	1	0-1	40
Pyrola chlorantha (green wintergreen)	1	0-1	40
Pyrola minor (snowline pyrola)	1	0-1	20
Pyrola secunda (one-sided wintergreen)	1	0-1	60
Pyrola uniflora (woodnymph)	1	0-1	20
Ranunculus uncinatus (little buttercup)	2	0-3	40
Saxifraga arguta (brook saxifrage)	1	0-1	20
Senecio pseudaureus (streambank groundsel)	2	0-3	40
Senecio triangularis (arrowleaf groundsel)	1	0-1	40
Smilacina stellata (starry Solomon-plume)	2	0-3	60
Solidago species (goldenrod)	1	0-1	20
Streptopus amplexifolius (clasping-leaved twisted-stalk)	2	0-3	40
Taraxacum officinale (common dandelion)	1	0-1	20
Thalictrum occidentale (western meadowrue)	2	0-3	60
Trifolium longipes (long-stalked clover)	1	0-1	20
Urtica dioica (stinging nettle)	1	0-1	40
Valeriana sitchensis (sitka valerian)	3	0-3	20
Veronica americana (American speedwell)	1	0-1	20
Veratrum viride (green false hellebore)	1	0-1	20
Ferns and Allies			
Equisetum arvense (field horsetail)	54	40-80	100
Equisetum hyemale (common scouring-rush)	1	0-1	20

SOILS

Soils on older terraces can classify to Mollisols (Aquolls or Borolls), yet the majority of sites key to Humic Cryaquepts (Hansen and others 1995). Parent material is often coarse textured alluvium with the coarse fragment content varying widely. Soils are usually wet throughout the year, often with standing water or saturated near the surface, and may be characterized as nutrient-rich, black, silty clays or silt loams over 45 cm (18 in) deep on some sites. Water tables are usually less than 50 cm (20 in) below the surface. Duff layers average 7 cm (3 in) thick, and exposed rock or mineral soil is rare in this habitat type.

ADJACENT COMMUNITIES

Adjacent wetter communities include sites dominated by willows, sedges, or the *Typha latifolia* (common cattail) habitat type. Adjacent drier sites include communities dominated by other *Picea* (spruce) habitat types and by *Abies lasiocarpa* (subalpine fir) or *Pseudotsuga menziesii* (Douglas fir) habitat types.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is moderate to high. However, these sites have little or no value for livestock other than shading. Soils are relatively sensitive to disturbance and cattle can easily churn the wet soil and destroy plant cover as well as limit conifer establishment (Youngblood and others 1985b).

Timber

Timber productivity is moderate (Pfister and others 1977, Steele and others 1983) but offers limited potential due to the extremely fragile sites. Due to high water tables, the trees are extremely susceptible to windthrow and soil loss may follow all forms of timber harvesting. Possible options for timber harvesting includes winter logging with at least 60 cm (around 24 in) of snow on the ground, designated skid trails, and winching (Pfister and Sherwood 1989). However, according to Steele and others (1983), even if logged when the ground is frozen to reduce equipment impacts, water tables can rise, creating additional problems in site management. High water tables resulting from harvesting activity may cause regeneration problems. *Picea* (spruce) is generally the only conifer to successfully occupy these sites, although other species may occasionally occur on drier raised hummocks (Hansen and others 1995).

Wildlife
Deer, elk, and moose show moderate winter use of this type. *Equisetum arvense* (field horsetail) is an important food source for grizzly bears (Knight and Blanchard 1983). During the summer months, black bear use these sites for wallows. Big game may use this habitat type, especially during the rutting season (Youngblood and others 1985b). Other wildlife, especially small mammals and avian species, may use these sites regularly because of their structural diversity. Big game may use this habitat type, especially during the rutting season (Youngblood and others 1985b). Great blue herons are known to nest in *Picea* (spruce) stands in Montana, if a high degree of isolation during nesting is possible (Parker 1980). Osprey will nest in old growth *Picea* (spruce) (Snow 1973).

Fisheries
Those stands of the *Picea/Equisetum arvense* (spruce/field horsetail) habitat type adjacent to streams provide hiding, thermal cover, and streambank stability for fish (Hansen and others 1995).

Fire
Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage.

Soil Management and Rehabilitation Opportunities
Road construction and development severely degrade areas along stream corridors and sites with high water tables, poor drainage, or organic soils. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

This discussion is an expanded description of the habitat type as defined by Pfister and others (1977). Similar habitat types were described for central Idaho (Steele and others 1981), eastern Idaho and western Wyoming (Steele and others 1983), northern Utah (Mauk and Henderson 1984), and central and southern Idaho (Youngblood and Mauk 1985). Kovalchik (1987) described a similar type (*Picea engelmannii/Equisetum arvense-Streptopus* (Engelmann spruce/field horsetail clasping-leaved twisted stalk) association for central Oregon. A similar community type has been described for western Wyoming (Norton and others 1981), eastern Idaho and western Wyoming (Youngblood and others 1985b), and for Utah and southeastern Idaho (Padgett and others 1989).

Picea/Galium triflorum Habitat Type
(Spruce/Sweetscented Bedstraw Habitat Type)

PICEA/GALTRI (PICEA/GATR)
Number of Stands Sampled = 14

LOCATION AND ASSOCIATED LANDFORMS

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type is an incidental type at moderately high elevations, 1636 to 2115 m (5,400 to 7500 ft), in the mountain ranges of eastern and northeastern Idaho. This habitat type generally borders streams, occupying moist alluvial benches/terraces and narrow floodplains of U-shaped canyons.

VEGETATION

Mature *Picea* species (spruce) may form a continuous, dense overstory, or may develop as clustered stands with scattered openings. *Abies lasiocarpa* (subalpine fir), *Populus tremuloides* (quaking aspen) and *Pinus* species (pine) may frequent these sites, but with limited coverages. Various shrubs, such as *Ribes lacustre* (swamp currant) and *Lonicera involucrata* (twin-berry), occur as components of the inconsequential shrub understory. A diversity of herbaceous species (Table 13) includes: *Actaea rubra* (baneberry), *Galium triflorum* (sweetscented bedstraw), *Osmorhiza chilensis* (mountain sweet-cicely) and *Thalictrum occidentale* (western meadowrue). The herbaceous layer is sparse under the dense *Picea* species (spruce) canopy, but may be quite lush where sporadic openings, often a result of windthrow, allow more light. Mosses are prevalent on the ground surface beneath the graminoids and forbs in some locations.

Table 13. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Picea/Galium triflorum* (spruce/ sweetscented bedstraw) habitat type (number = 7 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	2	0-3	57
Picea species (spruce)	73	0-80	86
Picea engelmannii (Engelmann spruce)	70	0-70	14
Pinus albicaulis (white-bark pine)	1	0-1	29
Pinus contorta (lodgepole pine)	3	0-3	43
Pinus flexilis (limber pine)	3	0-3	14
Populus tremuloides (quaking aspen)	2	0-3	29
Pseudotsuga menziesii (Douglas fir)	1	0-1	43
Shrubs			
Alnus incana (mountain alder)	2	0-3	29
Amelanchier alnifolia (western serviceberry)	1	0-1	43
Berberis repens (creeping Oregongrape)	1	0-1	71
Juniperus communis (common juniper)	1	0-1	43
Linnaea borealis (twinflower)	40	0-40	14
Lonicera involucrata (twin-berry)	6	0-20	71
Lonicera utahensis (Utah honeysuckle)	2	0-3	43
Ribes hudsonianum (stinking currant)	3	0-3	14
Ribes lacustre (swamp currant)	1	0-3	86
Rosa acicularis (prickly rose)	2	0-3	57
Rubus idaeus (red raspberry)	1	0-1	14
Rubus parviflorus (thimbleberry)	1	0-1	14
Salix scouleriana (Scouler willow)	1	0-1	29
Shepherdia canadensis (Canada buffaloberry)	2	0-3	29
Sorbus scopulina (Cascade mountain-ash)	1	0-1	14
Spiraea betulifolia (shiny-leaf spiraea)	1	0-1	14
Symphoricarpos albus (common snowberry)	1	0-3	71
Symphoricarpos oreophilus (mountain snowberry)	10	0-10	14
Graminoids			
Bromus anomalus (nodding brome)	3	0-3	29
Bromus carinatus (mountain brome)	1	0-1	14
Bromus vulgaris (Columbia brome)	1	0-1	29
Calamagrostis canadensis (bluejoint reedgrass)	3	0-3	14
Calamagrostis rubescens (pinegrass)	18	0-30	43
Carex disperma (soft-leaved sedge)	8	0-20	43
Carex geyeri (elk sedge)	1	0-1	29
Carex hoodii (Hood's sedge)	3	0-3	14
Carex praticola (Meadow Sedge)	1	0-1	14
Cinna latifolia (drooping woodreed)	3	0-3	14
Deschampsia cespitosa (tufted hairgrass)	1	0-1	14
Elymus glaucus (blue wildrye)	2	0-3	43
Luzula parviflora (small-flowered woodrush)	1	0-1	29
Melica subulata (Alaska oniongrass)	3	0-3	14
Oryzopsis asperifolia (roughleaf ricegrass)	1	0-1	14
Poa grayana (Gray's bluegrass)	1	0-1	14
Poa interior (Inland bluegrass)	1	0-1	14
Poa nervosa (Wheeler's bluegrass)	1	0-1	14
Forbs			
Achillea millefolium (common yarrow)	2	0-3	43
Actaea rubra (baneberry)	1	1-1	100
Allium brevistylum (short-style onion)	1	0-1	14
Allium geyeri (Geyer's onion)	1	0-1	14
Angelica arguta (sharptooth angelica)	2	0-3	29
Angelica pinnata (pinnate-leaved angelica)	1	0-1	14
Antennaria racemosa (raceme pussy-toes)	1	0-1	14
Aquilegia flavescens (yellow columbine)	2	0-3	29
Arenaria lateriflora (bluntleaf sandwort)	1	0-1	29
Arnica cordifolia (heart-leaf arnica)	10	0-10	14
Arnica latifolia (broadleaf arnica)	20	0-20	14
Astragalus alpinus (alpine milk-vetch)	1	0-1	14
Aster conspicuus (showy aster)	2	0-3	43
Aster engelmannii (Engelmann's aster)	2	0-3	43
Aster foliaceus (leafy aster)	2	0-3	43
Astragalus miser (weedy milk-vetch)	1	0-1	29
Campanula rotundifolia (lady's-thimble)	1	0-1	14
Castilleja miniata (scarlet paintbrush)	1	0-1	14
Cirsium arvense (Canada thistle)	1	0-1	14
Corallorhiza trifida (yellow coral-root)	1	0-1	14
Disporum trachycarpum (wartberry fairy-bell)	1	0-1	14
Epilobium angustifolium (fireweed)	1	0-1	43
Epilobium glaberrimum (smooth willow-herb)	1	0-1	14

Table 13 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Erythronium grandiflorum (glacier-lily)	7	0-20	43
Fragaria vesca (woods strawberry)	1	0-1	29
Fragaria virginiana (Virginia strawberry)	3	0-10	86
Galium boreale (northern bedstraw)	1	0-1	43
Galium triflorum (sweetscented bedstraw)	1	0-1	71
Gentianella amarella (northern gentian)	1	0-1	14
Geranium richardsonii (white geranium)	9	0-40	71
Geranium viscosissimum (sticky geranium)	3	0-3	14
Geum macrophyllum (larged-leaved avens)	1	0-1	29
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-1	29
Habenaria obtusata (blunt-leaf Rein-orchid)	1	0-1	14
Habenaria orbiculata (large round-leaved Rein-orchid)	1	0-1	14
Heracleum lanatum (cow-parsnip)	1	0-1	71
Hieracium albiflorum (white-flowered hawkweed)	1	0-1	14
Hydrophyllum capitatum (ballhead waterleaf)	1	0-1	14
Ligusticum tenuifolium (slender-leafed licorice-root)	1	0-1	14
Listera borealis (northern twayblade)	1	0-1	14
Listera cordata (heart-leaf twayblade)	1	0-1	29
Lomatium dissectum (fern-leaved desert-parsley)	1	0-1	14
Mertensia ciliata (mountain bluebell)	1	0-1	14
Myosotis sylvatica (wood forget-me-not)	1	0-1	14
Osmorhiza chilensis (mountain sweet-cicely)	3	1-10	100
Pedicularis bracteosa (bracted lousewort)	1	0-1	14
Potentilla diversifolia (diverse-leaved cinquefoil)	1	0-1	14
Potentilla gracilis (slender cinquefoil)	1	0-1	29
Pyrola asarifolia (pink wintergreen)	2	0-3	29
Pyrola chlorantha (green wintergreen)	1	0-1	71
Pyrola minor (snowline pyrola)	1	0-1	14
Pyrola secunda (one-sided wintergreen)	2	0-3	86
Saxifraga arguta (brook saxifrage)	1	0-1	29
Senecio pseudaureus (streambank groundsel)	2	0-3	57
Senecio triangularis (arrowleaf groundsel)	1	0-1	14
Smilacina racemosa (false spikenard)	1	0-1	57
Smilacina stellata (starry Solomon-plume)	1	0-3	86
Streptopus amplexifolius (clasping-leaved twisted-stalk)	2	0-3	43
Taraxacum officinale (common dandelion)	2	0-3	71
Thalictrum occidentale (western meadowrue)	8	0-20	86
Trifolium longipes (long-stalked clover)	1	0-1	29
Urtica dioica (stinging nettle)	1	0-1	14
Valeriana dioica (northern valerian)	1	0-1	14
Valeriana occidentalis (western valerian)	1	0-1	14
Veratrum viride (green false hellebore)	1	0-1	14
Viola macloskeyi (small white violet)	1	0-1	14
Viola nuttallii (yellow prairie violet)	1	0-1	14
Ferns and Allies			
Equisetum arvense (field horsetail)	4	0-10	43

SUCCESSIONAL INFORMATION

Pseudotsuga menziesii (Douglas fir), *Populus tremuloides* (quaking aspen), and *Pinus* species (pine) are commonly associated with seral stands of *Picea* species (spruce). Where gaps occur in the canopy due to windfall, infestations, or other disturbances, *Picea* species (spruce) establish quickly, out competing other species to form essentially homogeneous stands (Table 14). Youngblood and others (1985b) suggest that on extremely well-drained sites supporting the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) or *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/ Herbaceous) community types, the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type may represent the site's potential.

Table 14. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the of the *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type (number = 7 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	16	0-60	57
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	14

Table 14 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Picea species (spruce)	40	20-80	100
Pinus albicaulis (white-bark pine)	1	0-1	14
Pinus contorta (lodgepole pine)	12	0-20	57
Pinus ponderosa (ponderosa pine)	20	0-20	14
Populus tremuloides (quaking aspen)	11	0-20	29
Pseudotsuga menziesii (Douglas fir)	48	0-60	71
Shrubs			
Acer glabrum (Rocky Mountain maple)	3	0-3	14
Alnus sinuata (Sitka alder)	60	0-60	14
Amelanchier alnifolia (western serviceberry)	2	0-3	43
Berberis repens (creeping Oregongrape)	4	0-20	86
Chimaphila umbellata (common prince's-pine)	1	0-1	14
Clematis occidentalis (Columbia clematis)	1	0-1	14
Juniperus communis (common juniper)	1	0-1	29
Linnaea borealis (twinflower)	20	0-40	43
Lonicera involucrata (twin-berry)	1	0-1	14
Lonicera utahensis (Utah honeysuckle)	11	0-20	29
Pachistima myrsinites (mountain-boxwood)	1	0-1	14
Prunus virginiana (common chokecherry)	1	0-1	14
Rhamnus alnifolia (alder buckthorn)	1	0-1	14
Ribes hudsonianum (stinking currant)	3	0-3	14
Ribes lacustre (swamp currant)	2	0-3	57
Rosa acicularis (prickly rose)	6	0-20	57
Rosa woodsii (woods rose)	3	0-3	29
Rubus idaeus (red raspberry)	2	0-3	57
Rubus laciniatus (evergreen blackberry)	1	0-1	14
Rubus parviflorus (thimbleberry)	8	0-20	43
Salix scouleriana (Scouler willow)	1	0-1	14
Sambucus racemosa (red elderberry)	1	0-1	14
Shepherdia canadensis (Canada buffaloberry)	8	0-20	43
Sorbus scopulina (Cascade mountain-ash)	1	0-1	14
Spiraea betulifolia (shiny-leaf spiraea)	5	0-20	71
Symphoricarpos albus (common snowberry)	14	0-60	71
Vaccinium globulare (globe huckleberry)	1	0-1	14
Graminoids			
Bromus carinatus (mountain brome)	1	0-1	29
Bromus vulgaris (Columbia brome)	2	0-3	29

Table 14 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Calamagrostis canadensis (bluejoint reedgrass)	3	0-3	14
Calamagrostis rubescens (pinegrass)	13	0-40	71
Carex disperma (soft-leaved sedge)	20	0-20	14
Carex geyeri (elk sedge)	3	0-3	29
Carex rossii (Ross sedge)	1	0-1	14
Carex rostrata (beaked sedge)	1	0-1	14
Elymus glaucus (blue wildrye)	1	0-1	14
Festuca occidentalis (western fescue)	1	0-1	14
Glyceria elata (tall mannagrass)	3	0-3	14
Koeleria cristata (prairie junegrass)	1	0-1	14
Luzula parviflora (small-flowered woodrush)	1	0-1	14
Melica subulata (Alaska oniongrass)	2	0-3	29
Oryzopsis asperifolia (roughleaf ricegrass)	3	0-3	14
Phleum pratense (common timothy)	1	0-1	14
Poa nervosa (Wheeler's bluegrass)	1	0-1	14
Poa species (bluegrass)	1	0-1	14
Forbs			
Actaea rubra (baneberry)	1	1-3	100
Allium brevistylum (short-style onion)	1	0-1	14
Angelica arguta (sharptooth angelica)	1	0-1	14
Antennaria racemosa (raceme pussy-toes)	2	0-3	43
Arabis holboellii (Holboell's rockcress)	1	0-1	14
Arnica cordifolia (heart-leaf arnica)	17	0-60	57
Arnica latifolia (broadleaf arnica)	20	0-20	29
Aster conspicuus (showy aster)	2	0-3	86
Aster engelmannii (Engelmann's aster)	1	0-1	14
Aster laevis (smooth aster)	1	0-1	14
Astragalus miser (weedy milk-vetch)	1	0-1	14
Calypso bulbosa (fairy-slipper)	1	0-1	14
Campanula rotundifolia (lady's-thimble)	1	0-1	29
Castilleja miniata (scarlet paintbrush)	1	0-1	14
Collinsia parviflora (small-flowered blue-eyed Mary)	1	0-1	14
Corallorhiza striata (striped coral-root)	1	0-1	14
Disporum trachycarpum (wartberry fairy-bell)	2	0-3	71
Epilobium angustifolium (fireweed)	1	0-1	57
Erigeron peregrinus (subalpine daisy)	1	0-1	14
Erythronium grandiflorum (glacier-lily)	20	0-20	14
Fragaria vesca (woods strawberry)	2	0-3	43
Fragaria virginiana (Virginia strawberry)	2	1-3	100
Galium boreale (northern bedstraw)	1	0-1	43

Table 14 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Galium triflorum (sweetscented bedstraw)	1	1-3	100
Geranium richardsonii (white geranium)	1	0-1	29
Geranium viscosissimum (sticky geranium)	2	0-3	29
Geum macrophyllum (larged-leaved avens)	1	0-1	29
Goodyera oblongifolia (western rattlesnake-plantain)	1	0-1	29
Hedysarum sulphurescens (yellow hedysarum)	1	0-1	14
Heracleum lanatum (cow-parsnip)	1	0-1	29
Hieracium albiflorum (white-flowered hawkweed)	1	0-1	29
Lathyrus ochroleucus (cream-flowered peavine)	1	0-1	14
Mertensia ciliata (mountain bluebell)	1	0-1	14
Mertensia paniculata (panicle bluebells)	3	0-3	14
Mitella pentandra (five-stamened mitrewort)	1	0-1	14
Mitella trifida (three-tooth mitrewort)	1	0-1	14
Myosotis sylvatica (wood forget-me-not)	1	0-1	14
Osmorhiza chilensis (mountain sweet-cicely)	4	1-20	100
Osmorhiza occidentalis (western sweet-cicely)	2	0-3	29
Pedicularis bracteosa (bracted lousewort)	1	0-1	29
Pterospora andromedea (woodland pinedrops)	1	0-1	14
Pyrola chlorantha (green wintergreen)	1	0-1	43
Pyrola secunda (one-sided wintergreen)	1	0-3	86
Ranunculus uncinatus (little buttercup)	3	0-3	14
Senecio streptanthifolius (Rocky Mountain butterweed)	1	0-1	14
Senecio triangularis (arrowleaf groundsel)	2	0-3	29
Smilacina racemosa (false spikenard)	1	0-1	57
Smilacina stellata (starry Solomon-plume)	1	0-1	57
Stellaria jamesiana (sticky starwort)	1	0-1	14
Streptopus amplexifolius (clasping-leaved twisted-stalk)	2	0-3	29
Taraxacum officinale (common dandelion)	1	0-1	57
Thalictrum occidentale (western meadowrue)	10	0-40	71
Urtica dioica (stinging nettle)	1	0-1	14
Valeriana sitchensis (sitka valerian)	1	0-1	14
Veronica americana (American speedwell)	1	0-1	14
Veratrum viride (green false hellebore)	1	0-1	14
Vicia americana (American vetch)	1	0-1	14
Viola adunca (Hook violet)	1	0-1	14
Viola canadensis (Canada violet)	1	0-1	29
Viola orbiculata (round-leaved violet)	3	0-3	14
Ferns and Allies			
Cystopteris fragilis (brittle bladder-fern)	1	0-1	14
Equisetum arvense (field horsetail)	1	0-1	14
Equisetum hyemale (common scouring-rush)	1	0-1	14
Pteridium aquilinum (brakenfern)	1	0-1	14

SOILS

Surface soil textures of this habitat type range from sands to silts, although a minor clay component may be present. Gravels and cobbles are generally absent from the upper 30 cm (12 in). This type customarily occupies drier sites; therefore, soils do not display gleyed or mottled characteristics. Overlying leaf and needle litter/duff may be 2.5 cm (1 in) or more deep. Hansen and others (1995) state that these soils commonly develop from noncalcareous parent alluvium. Most soils have mollic epipedons, although those less developed are commonly Entisols. Some sites have histic characteristics, such as organic layers often exceeding 50 cm (20 in). Water tables are commonly within 1 m (39 in) of the surface throughout the growing season.

ADJACENT COMMUNITIES

Willow and sedge communities, as well as wetter *Picea* (spruce) habitat types, occupy wet sites adjacent to the *Picea/Galium triflorum* (spruce/sweet-scented bedstraw) habitat type. *Populus tremuloides* (quaking aspen) may also form stringer communities paralleling the stream bottoms, or broader stands on moist slopes. Upland sites are dominated by *Abies lasiocarpa* (subalpine fir), *Pseudotsuga menziesii* (Douglas fir) and upland *Picea* species (spruce) forested communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production under dense *Picea* (spruce) canopies is low to nonexistent. Where openings form due to windthrow, disease, or selective logging, forage availability may be better (Hansen and others 1995).

Timber
Timber productivity ranges from moderate to very high. However, streamside locations and high water tables may restrict timber harvest. Partial cutting will favor *Picea* species (spruce) while complete stand removal will result in mixed stands of *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine) and *Picea engelmannii* (Engelmann spruce). Uneven aged management should be considered as a possible silvicultural treatment in this habitat type (Hansen and others 1995).

Wildlife
Deer and elk use this type as winter range. Some of the broad, flat mountain valleys associated with this type may be prime yearlong moose habitat. Some sites may show sustained heavy use by moose and elk. Great blue herons are known to nest in *Picea* species (spruce) stands, if a high degree of isolation during nesting is possible (Parker 1980). Osprey will nest in old growth *Picea* species (spruce) (Snow 1973).

Fisheries
When associated with stream corridors, this habitat type may provide bank stability, enhance fish habitat requirements as windfall and deadfall trees offer cover and create plunge pools, and protect against thermal heating during summer months (Hansen and others 1995).

Fire
Fire susceptibility is low. However, *Picea engelmannii* (Engelmann spruce), including hybrids with *Picea glauca* (white spruce), is easily killed by fire (Fischer and Bradley 1987). The dead, dry, flammable lower limbs, low growing canopy, thin bark, and lichen growth in the branches contribute to the species' low resistance. The shallow root system is readily subject to injury from fire burning through the duff. Large older trees may occasionally survive one or more light fires, but deep accumulations of resinous needle litter around their bases usually make them very susceptible to fire damage (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Machinery and livestock easily compact or otherwise damage the soil during periods with high water tables. Poorly drained sites, streamside locations, or sites with organic soils should also warrant special concern. Roads and trails should be located on the adjacent uplands (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of high water tables and the problems with road construction, campgrounds should not be located in this type.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

The *Picea/Galium triflorum* (spruce/sweetscented bedstraw) habitat type was first described by Pfister and others in their 1977 publication for Montana. Hansen and others (1995) also document this type for Montana. A similar habitat type was described by Steele and others (1981) for central Idaho, Steele and others (1983). Somewhat similar community types were also described by Youngblood and others (1985b) for eastern Idaho and western Wyoming and by Padgett and others (1989) for Utah and southeastern Idaho.

***Pinus flexilis Community* Type (Limber Pine Community Type)**

PINFLE (PIFL)
Number of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Pinus flexilis* (limber pine) community type is an incidental type at mid elevations in mountains and valleys of Idaho. Elevations of sampled sites range from 1,940 to 2,050 m (6,400 to 6,765 ft). This community type occupies alluvial benches along streams and rivers in U- and V-shaped canyons, or may be found on hillsides below seeps and springs. It is often found on drier, marginally riparian sites.

VEGETATION

Pinus flexilis (limber pine) represents the dominant tree in the tallest layer; however, lower growing species, such as *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper), may also be present with significant coverages. The *Pinus flexilis* (limber pine) community type forms open stands of scattered individuals in the overstory, but may be characterized by a well developed shrub layer of *Betula occidentalis* (water birch), *Symphoricarpos occidentalis* (western snowberry), or *Prunus virginiana* (common chokecherry). The herbaceous understory includes a variety of graminoids and forbs including, but not limited to: *Osmorhiza chilensis* (mountain sweet-cicely), *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome), *Equisetum arvense* (field horsetail), and *Fragaria virginiana* (Virginia strawberry) (Table 15).

Table 15. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Pinus flexilis* (limber pine) community type (number = 2 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	17	3-30	100
Pinus flexilis (limber pine)	40	30-50	100
Populus tremuloides (quaking aspen)	30	0-30	50
Pseudotsuga menziesii (Douglas fir)	10	0-10	50
Shrubs			
Amelanchier alnifolia (western serviceberry)	10	0-10	50
Artemisia tridentata (big sagebrush)	2	1-3	100
Berberis repens (creeping Oregongrape)	3	0-3	50
Betula occidentalis (water birch)	40	0-40	50
Chrysothamnus nauseosus (common rabbitbrush)	1	0-1	50
Prunus virginiana (common chokecherry)	30	0-30	50
Ribes setosum (Missouri gooseberry)	10	0-10	50
Rosa woodsii (woods rose)	6	1-10	100
Symphoricarpos occidentalis (western snowberry)	40	0-40	50
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	50
Agrostis exarata (spike bentgrass)	3	0-3	50
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	50
Agrostis stolonifera (redtop)	1	0-1	50
Bromus inermis (smooth brome)	10	0-10	50
Carex leptalea (bristle-stalked sedge)	1	0-1	50
Carex microptera (small-winged sedge)	3	0-3	50
Carex rostrata (beaked sedge)	1	0-1	50
Dactylis glomerata (orchard-grass)	3	0-3	50
Elymus flavescens (yellow wildrye)	1	0-1	50
Elymus glaucus (blue wildrye)	3	0-3	50
Glyceria striata (fowl mannagrass)	1	0-1	50
Juncus balticus (Baltic rush)	3	0-3	50
Poa pratensis (Kentucky bluegrass)	7	3-10	100
Forbs			
Achillea millefolium (common yarrow)	2	1-3	100
Antennaria microphylla (rosy pussy-toes)	1	0-1	50
Aquilegia formosa (sitka columbine)	10	0-10	50
Arnica longifolia (longleaf arnica)	1	0-1	50
Aster eatonii (Eaton's aster)	10	0-10	50
Aster occidentalis (western aster)	1	0-1	50
Cicuta maculata (spotted water-hemlock)	3	0-3	50
Collomia linearis (narrow-leaf collomia)	1	0-1	50
Cynoglossum officinale (common hound's-tongue)	1	0-1	50
Fragaria virginiana (Virginia strawberry)	10	0-10	50
Geranium viscosissimum (sticky geranium)	3	0-3	50
Lupinus species (lupine)	3	0-3	50
Nepeta cataria (catnip)	3	0-3	50
Osmorhiza chilensis (mountain sweet-cicely)	10	0-10	50
Oxytropis viscida (Sticky Crazyweed)	1	0-1	50
Rudbeckia occidentalis (black head)	3	0-3	50
Silene menziesii (Menzies' silene)	1	0-1	50
Smilacina racemosa (false spikenard)	1	0-1	50
Smilacina stellata (starry Solomon-plume)	3	0-3	50
Taraxacum officinale (common dandelion)	3	0-3	50
Tragopogon dubius (goat's beard)	1	0-1	50
Urtica dioica (stinging nettle)	3	0-3	50
Viola orbiculata (round-leaved violet)	1	0-1	50
Wyethia amplexicaulis (northern mule's-ears)	10	0-10	50
Ferns and Allies			
Equisetum arvense (field horsetail)	20	0-20	50

SUCCESSIONAL INFORMATION

Seral stands of this type may be dominated by *Populus tremuloides* (quaking aspen), *Juniperus scopulorum* (Rocky Mountain juniper), or *Betula occidentalis* (water birch); however, *Pinus flexilis* (limber pine) will eventually surpass these species in the upper canopy layers to dominate the sites. The presence of *Pseudotsuga menziesii* (Douglas fir) or *Abies lasiocarpa* (subalpine fir) in some stands suggests that the *Pinus flexilis* (limber pine) community type may act as a mid-seral stage for either of these habitat types. Pfister and others (1977) indicate that on upland sites, *Pinus flexilis* (limber pine) is a codominant with *Pseudotsuga menziesii* (Douglas fir) and appears to continue to reproduce and flourish even under the presence of this taller species. The relationship between these two species in riparian zones is not fully understood at this time.

SOILS

Approximately 2.5 cm (1 in) or more of needle/leaf litter may cover the ground surface. Where this type occurs along stream and river channels, substrates are predominantly alluvial. Mineral soils are composed of silts and sands with moderate clay components, and are typically classified as Entisols. River cobbles and gravels become prevalent at a depth of 30 cm (12 in) or more. Where this type occurs on hillsides below subsurface seeps, silts and clays tend to dominate the upper soil layers. Gravels and cobbles are essentially absent, but larger rocks occur sporadically.

ADJACENT COMMUNITIES

Slightly wetter adjacent communities may include the *Betula occidentalis* (water birch) community type. Adjacent uplands are dominated by *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper) forests, shrubland communities such as *Artemisia tridentata* (big sagebrush), or mixed grasslands. The *Populus tremuloides/Wyethia* species (quaking aspen/mule's-ears) community type described by Mueggler (1988) may occupy nearby depressional areas as well.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Pfister and others (1973) indicate that forage production ranges from low to moderate for the *Pinus flexilis* (limber pine) series on upland sites. Characteristically sparse herbaceous understories observed on sites adjacent to stream corridors suggest low forage value for these locations. However, due to the presence of water and the xeric conditions of the surrounding upland communities, the *Pinus flexilis* (limber pine) community type may receive extensive use by livestock. Where this community type occurs on hillsides below seeps and springs, the herbaceous understory is often more dense and may provide moderate.

Timber

Timber productivity is marginal. *Pinus flexilis* (limber pine) seldom obtain heights over 15 m (50 ft), and basal areas are considered low. Sites should be managed for uses other than timber (Pfister and others 1977).

Wildlife

Big game use may be moderate to high during winter months for certain types of the *Pinus flexilis* (limber pine) series on upland sites (Pfister and others 1973). As a riparian community, this type may provide cover and moderate forage for deer or elk. The *Pinus flexilis* (limber pine) community type may offer cover and nest sites for a variety of birds and mammals as well due to the multi-layered structure of the canopy.

Fisheries

This community type may be suitable for fisheries management. The overstory tree and shrub component should protect against elevated summer temperatures, offer bank stability and debris recruitment. However, bare ground may constitute 15 percent or more of the streambanks and compromise water quality during high flows.

Fire

Fire hazard is moderate to low for *Pinus flexilis* (limber pine) communities on upland sites (Pfister and others 1973). Mature *Pinus flexilis* (limber pine) appear able to withstand low intensity ground fires although fuel loading may promote more destructive, stand replacement fires. Fire frequency appears to be partially dependent on the understory species composition and density on site.

Soil Management and Rehabilitation Opportunities

Coarse textured substrates on sites adjacent to stream corridors are not susceptible to compaction. Streambank stabilization is dependent on a well-developed shrub and herbaceous understory and should be managed accordingly.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

The recreational status of this type is currently undetermined. It is unsuitable for camping or hiking where it occupies steep side slopes along narrow stream corridors, but may offer opportunities for wildlife observation or possibly fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has not been previously described for riparian communities. However, Pfister and others (1977) described a *Pinus flexilis* (limber pine) series for upland forests in Montana east of the Continental Divide.

Pseudotsuga menziesii/Cornus stolonifera Habitat Type (Douglas Fir/Red-Osier Dogwood Habitat Type)

PSEMEN/CORSTO (PSME/COST4)
Number of Stands Sampled = 15

LOCATION AND ASSOCIATED LANDFORMS

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type is a major type from mid to higher elevations throughout the mountains and valleys of Idaho. Elevations of sampled sites range from 1,550 to 2,250 m (5,115 to 7,425 ft). This habitat type often occupies drier sites on alluvial benches of streams and rivers, and on sideslopes of narrow V-shaped drainages.

VEGETATION

Sites are typically dominated by *Pseudotsuga menziesii* (Douglas fir), with *Populus tremuloides* (quaking aspen) and *Juniperus scopulorum* (Rocky Mountain juniper) often associated as minor components. Where *Pseudotsuga menziesii* (Douglas fir) forms a closed overhead canopy, the understory may be depauperate. Open stands of this type are often characterized by more dense undergrowth. The shrub layer usually consists of *Acer glabrum* (Rocky Mountain maple), *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and *Rosa woodsii* (woods rose). The herbaceous layer is characterized by a variety of graminoids and forbs, including *Actaea rubra* (baneberry), *Geranium viscosissimum* (sticky geranium), *Thalictrum occidentale* (western meadowrue), *Senecio serra* (tall butterweed), and *Smilacina racemosa* (false spikenard) (Table 16). While species richness is relatively high within the lower canopy layers, canopy cover and constancy for the individual species are nominal. This pattern appears to be consistent for many of the conifer-dominated types in riparian zones.

Table 16. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (number = 6 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	5	0-10	67
Populus tremuloides (quaking aspen)	8	0-10	50
Pseudotsuga menziesii (Douglas fir)	57	30-80	100
Shrubs			
Acer glabrum (Rocky Mountain maple)	14	0-20	50
Acer grandidentatum (bigtooth maple)	10	0-10	17
Amelanchier alnifolia (western serviceberry)	5	0-10	50
Berberis repens (creeping Oregongrape)	5	0-10	50
Betula occidentalis (water birch)	11	0-20	33
Clematis ligusticifolia (western virgins-bower)	3	0-3	17
Cornus canadensis (bunchberry)	1	0-1	17
Cornus stolonifera (red-osier dogwood)	26	0-70	83
Pachistima myrsinites (mountain-boxwood)	10	0-10	17
Prunus virginiana (common chokecherry)	12	0-20	83
Ribes species (currant; gooseberry)	1	0-1	17
Ribes lacustre (swamp currant)	3	0-3	50
Rosa woodsii (woods rose)	5	0-10	83
Rubus parviflorus (thimbleberry)	3	0-3	33
Salix bebbiana (Bebb willow)	2	0-3	33
Salix boothii (Booth willow)	1	0-1	17
Spiraea betulifolia (shiny-leaf spiraea)	11	0-20	50
Symphoricarpos albus (common snowberry)	17	0-20	50
Symphoricarpos occidentalis (western snowberry)	1	0-1	17
Symphoricarpos oreophilus (mountain snowberry)	20	0-20	17
Graminoids			
Agropyron caninum (bearded wheatgrass)	5	0-10	50
Agropyron species (wheatgrass)	3	0-3	17
Agrostis stolonifera (redtop)	3	0-3	17
Bromus carinatus (mountain brome)	1	0-1	33
Bromus ciliatus (fringed brome)	1	0-1	17
Bromus inermis (smooth brome)	1	0-1	17
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	17
Calamagrostis rubescens (pinegrass)	30	0-30	33
Carex disperma (soft-leaved sedge)	3	0-3	17
Carex species (sedges)	1	0-1	17
Carex geyeri (elk sedge)	1	0-1	17
Carex microptera (small-winged sedge)	3	0-3	17
Carex petasata (Liddon's sedge)	10	0-10	17
Elymus glaucus (blue wildrye)	3	0-3	17
Festuca subulata (bearded fescue)	1	0-1	17
Glyceria striata (fowl mannagrass)	3	0-3	33
Melica bulbosa (oniongrass)	1	0-1	17
Phleum pratense (common timothy)	3	0-3	17
Poa pratensis (Kentucky bluegrass)	3	0-3	67
Poa scabrella (pine bluegrass)	1	0-1	17

Table 16 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Stipa occidentalis (western needlegrass)	1	0-1	17
Forbs			
Achillea millefolium (common yarrow)	3	0-3	17
Aconitum columbianum (Columbian monkshood)	1	0-1	17
Actaea rubra (baneberry)	3	0-3	67
Angelica arguta (sharptooth angelica)	1	0-1	17
Antennaria parvifolia (Nuttall's pussy-toes)	1	0-1	17
Apocynum androsaemifolium (spreading dogbane)	20	0-20	17
Aquilegia formosa (sitka columbine)	20	0-20	17
Arabis species (rockcress)	1	0-1	17
Arnica cordifolia (heart-leaf arnica)	2	0-3	33
Arnica latifolia (broadleaf arnica)	3	0-3	17
Aster species (aster)	10	0-10	17
Aster foliaceus (leafy aster)	3	0-3	17
Aster occidentalis (western aster)	3	0-3	17
Cirsium arvense (Canada thistle)	3	0-3	17
Clintonia uniflora (queen's cup)	1	0-1	17
Crepis acuminata (tapertip hawksbeard)	1	0-1	17
Cynoglossum officinale (common hound's-tongue)	1	0-1	17
Disporum trachycarpum (wartberry fairy-bell)	3	0-3	17
Epilobium angustifolium (fireweed)	2	0-3	33
Epilobium ciliatum (common willow-herb)	1	0-1	17
Epilobium minutum (small-flowered willow-herb)	1	0-1	17
Erigeron speciosus (showy fleabane)	1	0-1	17
Fragaria virginiana (Virginia strawberry)	3	0-3	17
Galium aparine (goose-grass)	7	0-10	33
Galium triflorum (sweetscented bedstraw)	2	0-3	50
Geranium viscosissimum (sticky geranium)	14	0-20	50
Geum macrophyllum (larged-leaved avens)	3	0-3	33
Habenaria species (bog-orchid; Rein-orchid)	1	0-1	17
Habenaria unalascensis (Alaska Rein-orchid)	1	0-1	17
Heuchera grossulariifolia (gooseberry-leaved alumroot)	1	0-1	17
Lactuca serriola (prickly lettuce)	1	0-1	17
Lupinus argenteus (silvery lupine)	1	0-1	17
Melilotus officinalis (yellow sweet-clover)	1	0-1	17
Mentha arvensis (field mint)	1	0-1	17
Mimulus guttatus (common monkey-flower)	1	0-1	17
Myosotis species (forget-me-not)	3	0-3	17
Nepeta cataria (catnip)	2	0-3	33
Osmorhiza chilensis (mountain sweet-cicely)	4	0-10	67
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	17
Rudbeckia occidentalis (black head)	1	0-1	17
Senecio indecorus (rayless mountain butterweed)	1	0-1	17
Senecio serra (tall butterweed)	7	0-10	33
Smilacina racemosa (false spikenard)	5	0-10	83
Smilacina stellata (starry Solomon-plume)	3	0-3	33
Solidago canadensis (Canada goldenrod)	1	0-1	17
Taraxacum officinale (common dandelion)	3	0-3	33
Thalictrum occidentale (western meadowrue)	5	0-10	50
Tragopogon dubius (goat's beard)	1	0-1	17
Urtica dioica (stinging nettle)	1	0-1	33
Viola adunca (Hook violet)	1	0-1	17
Ferns and Allies			
Cystopteris fragilis (brittle bladder-fern)	3	0-3	17
Equisetum arvense (field horsetail)	22	0-40	33
Equisetum hyemale (common scouring-rush)	1	0-1	17
Equisetum laevigatum (smooth scouring-rush)	1	0-1	33

SUCCESSIONAL INFORMATION

Stands of *Populus tremuloides* (quaking aspen), and a variety of shrub-dominated communities, typically willows, *Alnus incana* (mountain alder), or *Betula occidentalis* (water birch), represent seral stages of this habitat type. *Pseudotsuga menziesii* (Douglas fir) will be present and successfully reproducing, although only as an understory component, in the initial phases of this type. Pole-sized and mature individuals become more prevalent as the site shifts toward climax. On slightly drier riparian sites, *Juniperus scopulorum* (Rocky Mountain juniper) may function as a seral stage (Table 17).

The degree of disturbance on a particular site can often be determined by the composition of the understory species present. *Cornus stolonifera* (red-osier dogwood), *Acer glabrum* (Rocky Mountain maple), and *Prunus virginiana* (common chokecherry) may be preferentially browsed by livestock and big game. As grazing intensifies, these species may be replaced by more disturbance tolerant shrubs such as *Symphoricarpos* species (snowberry) and *Rosa* species (rose). Continued grazing pressure may result in the loss of the shrub constituency altogether and the invasion of disturbance induced herbaceous species such as *Poa pratensis* (Kentucky bluegrass). This shift from a shrub-dominated to an herbaceous-dominated understory may cause the overall site to dry out. Once the shrub layer disappears from an area, it may be difficult and costly to recover. Management should consider strategies to avoid this advanced state before irreversible conditions prevail (Hansen and others 1995).

Table 17. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Pseudotsuga menziesii/ Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (number = 9 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	9	0-20	44
Pinus ponderosa (ponderosa pine)	1	0-1	11
Populus tremuloides (quaking aspen)	9	0-20	44
Populus trichocarpa (black cottonwood)	20	0-20	11
Pseudotsuga menziesii (Douglas fir)	46	20-90	100
Shrubs			
Acer glabrum (Rocky Mountain maple)	8	0-10	44
Alnus incana (mountain alder)	10	0-10	11
Amelanchier alnifolia (western serviceberry)	2	0-3	22
Berberis repens (creeping Oregongrape)	3	0-3	11
Betula occidentalis (water birch)	8	0-30	44
Clematis ligusticifolia (western virgins-bower)	1	0-1	11
Cornus canadensis (bunchberry)	1	0-1	11
Cornus stolonifera (red-osier dogwood)	14	0-40	44
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	11
Prunus virginiana (common chokecherry)	21	0-30	44
Ribes species (currant; gooseberry)	2	0-3	22
Ribes odoratum (buffalo currant)	10	0-10	11
Ribes setosum (Missouri gooseberry)	3	0-3	11
Ribes viscosissimum (sticky currant)	3	0-3	11
Rosa acicularis (prickly rose)	40	0-40	11
Rosa woodsii (woods rose)	7	0-30	89
Rubus idaeus (red raspberry)	1	0-1	11
Rubus parviflorus (thimbleberry)	1	0-1	11
Salix bebbiana (Bebb willow)	1	0-1	22
Salix boothii (Booth willow)	1	0-1	11
Salix exigua (sandbar willow)	3	0-3	11
Sambucus racemosa (red elderberry)	3	0-3	11
Shepherdia canadensis (Canada buffaloberry)	2	0-3	22
Symphoricarpos albus (common snowberry)	2	0-3	33
Symphoricarpos occidentalis (western snowberry)	14	0-20	33
Symphoricarpos oreophilus (mountain snowberry)	10	0-10	11
Graminoids			
Agropyron caninum (bearded wheatgrass)	20	0-20	11
Agrostis exarata (spike bentgrass)	1	0-1	11
Agropyron species (wheatgrass)	1	0-1	11
Agropyron repens (quackgrass)	1	0-1	11
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	11
Agrostis stolonifera (redtop)	9	0-20	33
Bromus ciliatus (fringed brome)	1	0-1	11
Bromus inermis (smooth brome)	1	0-1	11
Bromus tectorum (cheatgrass)	1	0-1	11
Calamagrostis species (reedgrass)	3	0-3	11
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	11
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	11
Carex crawfordii (Crawford's sedge)	1	0-1	11
Carex disperma (soft-leaved sedge)	3	0-3	11
Carex geyeri (elk sedge)	1	0-1	11
Carex rostrata (beaked sedge)	1	0-1	11
Elymus cinereus (basin wildrye)	2	0-3	22
Elymus glaucus (blue wildrye)	15	0-20	22
Festuca scabrella (rough fescue)	1	0-1	11
Glyceria striata (fowl mannagrass)	5	0-10	33
Phalaris arundinacea (reed canarygrass)	10	0-10	11
Phleum pratense (common timothy)	9	0-20	33
Poa palustris (fowl bluegrass)	2	0-3	22
Poa pratensis (Kentucky bluegrass)	11	0-20	33
Forbs			
Achillea millefolium (common yarrow)	1	0-1	33
Actaea rubra (baneberry)	2	0-3	22
Allium brevistylum (short-style onion)	1	0-1	11
Angelica arguta (sharptooth angelica)	1	0-1	22
Aquilegia formosa (sitka columbine)	1	0-1	11
Arctium minus (common burdock)	3	0-3	11
Arnica cordifolia (heart-leaf arnica)	12	0-20	22
Artemisia ludoviciana (prairie sagewort)	2	0-3	22
Aster eatonii (Eaton's aster)	3	0-3	11
Aster species (aster)	1	0-1	22
Aster foliaceus (leafy aster)	12	0-20	22
Aster occidentalis (western aster)	3	0-3	33

Table 17 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Balsamorhiza sagittata (arrowleaf balsamroot)	1	0-1	11
Campanula rotundifolia (lady's-thimble)	1	0-1	11
Carduus nutans (musk thistle)	1	0-1	11
Castilleja species (Indian-paintbrush; paintbrush)	1	0-1	11
Cicuta maculata (spotted water-hemlock)	1	0-1	11
Cirsium arvense (Canada thistle)	6	0-10	22
Cirsium vulgare (bull thistle)	1	0-1	11
Collomia linearis (narrow-leaf collomia)	1	0-1	11
Collinsia parviflora (small-flowered blue-eyed Mary)	2	0-3	22
Cynoglossum officinale (common hound's-tongue)	3	0-3	11
Epilobium angustifolium (fireweed)	3	0-3	22
Epilobium ciliatum (common willow-herb)	2	0-3	44
Forb	10	0-10	11
Fragaria vesca (woods strawberry)	3	0-3	11
Fragaria virginiana (Virginia strawberry)	1	0-1	33
Galium aparine (goose-grass)	6	0-10	22
Galium boreale (northern bedstraw)	1	0-1	22
Galium triflorum (sweetscented bedstraw)	1	0-1	22
Geranium richardsonii (white geranium)	1	0-1	33
Geranium viscosissimum (sticky geranium)	3	0-10	44
Geum macrophyllum (larged-leaved avens)	2	0-3	33
Habenaria species (bog-orchid; Rein-orchid)	1	0-1	11
Heracleum lanatum (cow-parsnip)	2	0-3	22
Hydrophyllum capitatum (ballhead waterleaf)	3	0-3	11
Lactuca oblongifolia (blue lettuce)	1	0-1	11
Lactuca serriola (prickly lettuce)	1	0-1	11
Lithospermum ruderale (western gromwell)	1	0-1	11
Lupinus argenteus (silvery lupine)	1	0-1	11
Mentha arvensis (field mint)	3	0-3	22
Mertensia ciliata (mountain bluebell)	1	0-1	11
Nepeta cataria (catnip)	1	0-1	22
Osmorhiza chilensis (mountain sweet-cicely)	7	0-10	22
Osmorhiza depauperata (blunt-fruit sweet-cicely)	3	0-3	11
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	11
Penstemon species (penstemon)	1	0-1	11
Rudbeckia occidentalis (black head)	10	0-10	11
Rumex crispus (curly dock)	3	0-3	11
Senecio canus (woolly groundsel)	3	0-3	22
Senecio cymbalarioides (few-leaved groundsel)	1	0-1	11
Senecio serra (tall butterweed)	1	0-3	56
Silene menziesii (Menzies' silene)	2	0-3	33
Smilacina racemosa (false spikenard)	10	0-10	22
Smilacina stellata (starry Solomon-plume)	4	0-10	44
Solidago canadensis (Canada goldenrod)	2	0-3	22
Solidago species (goldenrod)	1	0-1	11
Taraxacum officinale (common dandelion)	2	0-3	33
Thalictrum species (meadowrue)	1	0-1	11
Thalictrum occidentale (western meadowrue)	2	0-3	33
Urtica dioica (stinging nettle)	2	0-3	33
Veronica americana (American speedwell)	1	0-1	11
Verbascum thapsus (common mullein)	1	0-1	11
Viola species (violet)	3	0-3	11
Viola nephrophylla (northern bog violet)	1	0-1	11
Ferns and Allies			
Equisetum arvense (field horsetail)	21	0-40	33

SOILS

The overlying litter/duff layer is variable and may be moderately extensive or virtually non-existent depending on the particular site. The texture of soils in the upper layers ranges from fine sands to silts and clays. When present, an organic horizon, often with distinguishable Oa, Oe, and Oi subhorizons, may be 30 cm (12 in) deep, but is generally not more than 5-10 cm (2-4 in) in depth. Loams are often dominant in the upper 25 cm (10 in). The underlying substrate is generally alluvium, composed of coarse sands, gravels, and cobbles. Large rocks may be present where this type occupies locations at the base of scree slopes. Sites tend to be well-drained due to this unconsolidated layer. Water tables occur near the surface for sites situated immediately adjacent to streams, but may extend to depths over 150 cm (60 in) on elevated floodplains or on sideslopes of canyons.

ADJACENT COMMUNITIES

Adjacent riparian communities may be dominated by willows, *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), and *Populus tremuloides* (quaking aspen). *Pseudotsuga menziesii* (Douglas fir) and

Juniperus scopulorum (Rocky Mountain juniper) form forests on the uplands with *Populus tremuloides* (quaking aspen), but invade the riparian zone where physical site factors provide suitable habitat. *Artemisia tridentata* (big sagebrush) shrublands and mixed grasslands may occupy the plateaus above riverine canyons.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Access to this type by livestock may be limited due to steep canyon walls, narrow riparian zones, and unstable scree slopes. Where access is available, livestock may remain in the riparian zone for extended periods where water and forage are available. Managers should attempt to limit full access to these areas in order to avoid the removal of the shrub layer (see Successional Information section).

Timber

Limited information is available on this type. Timber productivity is estimated to be moderate. Because of at least seasonally high water tables, these sites probably represent some of the better timber producing sites for *Pseudotsuga menziesii* (Douglas fir). Clearcutting will set the site back to seral shrub stages and new regeneration of *Pseudotsuga menziesii* (Douglas fir) may be slow due to increased competition from forbs, graminoids, and shrubs. A three-step shelterwood cut may be the best method to use in achieving harvest regeneration (Hansen and others 1995).

Wildlife

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type provides valuable hiding cover and shade for a variety of species. Big game use may be high, depending upon the time of year. Whitetail deer may use this type year round as cover, while other big game species may use this type as cover only in the winter (Hansen and others 1995)

Cornus stolonifera (red-osier dogwood) is favored by moose (Costain 1989) and beaver (Allen 1983) when present. Canada geese occasionally use the nests previously built in *Pseudotsuga menziesii* (Douglas fir) by bald eagles and osprey. In Montana, if a high degree of isolation during nesting is possible, great blue herons also nest in *Pseudotsuga menziesii* (Douglas fir) stands (Parker 1980). A variety of birds and mammals, such as woodpeckers, wood ducks, and raccoons, nest in the trunk cavities.

Fisheries

The streamside location of this type is important in providing thermal cover, debris recruitment, and streambank stability. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Fire potential is moderate, especially in late summer or during open, dry winters. Mature *Pseudotsuga menziesii* (Douglas fir) is a relatively fire resistant tree (Fischer and Bradley 1987). However, seedlings and saplings are vulnerable to surface fires because of their thin, photosynthetically active bark, resin blisters, closely spaced flammable needles, and thin twigs and bud scales. The moderately low and dense branching characteristic of saplings allows surface fires to be carried into the crown layer. Older trees develop a relatively unburnable, thick layer of insulative corky bark that provides protection against cool to moderately severe fires. Fire resistant bark takes about 40 years to develop on moist sites. *Pseudotsuga menziesii* (Douglas fir) regeneration is favored by fire, which eliminates competition and creates favorable seedbeds.

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Coarse textured substrates are not susceptible to compaction, yet this type is subject to infrequent flooding. Soils are relatively stable due to the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer for streambank stabilization.

Where revegetation with woody species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and bird watching (Hansen and others 1995)

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = needle-leaved evergreen; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

The *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type was described by Hansen and others (1995) for Montana.

Acer negundo/Cornus stolonifera Habitat Type (Box-Elder/Red-Osier Dogwood Habitat Type)

ACENEG/CORSTO (ACNE2/COST4)
Number of Stands Sampled = 21

LOCATION AND ASSOCIATED LANDFORMS

The *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type, a minor type in southern and eastern Idaho, is recorded at elevations of 1,030 to 1600 m (3,400 to 5,280 ft). This habitat type occurs along seeps and streams in ravines and wider U-shaped canyons, or on broad, active, and secondary (upper) floodplains on major riverine systems, such as the South Fork of the Snake River. Sites may be occasionally flooded by overland flows during spring runoff.

VEGETATION

On wide riverine floodplains, *Acer negundo* (box-elder) may develop as a complex mosaic with *Fraxinus pennsylvanica* (green ash), *Salix lutea* (yellow willow), and *Populus angustifolia* (narrowleaf cottonwood). On smaller drainages, the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type is associated with a diverse range of shrub communities. *Acer negundo* (box-elder) typically dominates late seral stands as the sole overstory species. *Acer grandidentatum* (bigtooth maple) or *Betula occidentalis* (water birch) may be present in the upper shrub layer, while *Cornus stolonifera* (red-osier dogwood), and to a lesser degree *Prunus virginiana* (common chokecherry), occupy the lower shrub levels (Table 18). Where mature *Acer negundo* (box-elder) and taller shrubs form a dense canopy, the understory may be sparse and exhibit low vigor. Stands that are more open may include a prominent herbaceous layer. However, with increased grazing pressure, sites shift to a predominance of certain disturbance-induced, undesirable, understory species such as *Rosa woodsii* (woods rose), *Arctium minus* (common burdock), *Poa pratensis* (Kentucky bluegrass), and *Urtica dioica* (stinging nettle).

Table 18. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type (number = 21 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Acer negundo (box-elder)	63	20-98	100
Shrubs			
Clematis ligusticifolia (western virgins-bower)	12	0-30	33
Cornus stolonifera (red-osier dogwood)	14	0-40	48
Prunus virginiana (common chokecherry)	21	0-50	33
Rosa woodsii (woods rose)	24	0-70	67
Graminoids			
Poa pratensis (Kentucky bluegrass)	25	0-90	57
Forbs			
Arctium minus (common burdock)	17	0-50	33
Cirsium arvense (Canada thistle)	4	0-10	29
Cynoglossum officinale (common hound's-tongue)	2	0-3	33
Urtica dioica (stinging nettle)	1	0-3	38

SUCCESSIONAL INFORMATION

Acer grandidentatum (bigtooth maple), *Betula occidentalis* (water birch), and willow communities may represent seral stages for the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type in Idaho. The presence of small, discontinuous stands of *Populus tremuloides* (quaking aspen) and *Populus angustifolia* (narrowleaf cottonwood) associated with this habitat type suggest that both of these communities may also act as mid-seral stages for this riparian association.

Hansen and others (1995) indicate that primary successional stages of the similar habitat type, the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type in Montana, may be dominated by a variety of types including cottonwoods, *Salix exigua* (sandbar willow), or *Salix amygdaloides* (peach-leaf willow) community types. As a cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, primary succession will continue from multi-layered cottonwood forests, dominated by the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type or the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type, to the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type.

Hansen and others (1995) have noted that under heavy grazing pressures in Montana, *Acer negundo* (box-elder) reproduction is either severely restricted or eliminated. At this stage, most of the saplings and pole-sized trees have either been eliminated by trampling and/or rubbing, or browsed back until they are dead. High levels of grazing cause the stand to open up allowing the more sun tolerant, less desirable species such as *Symphoricarpos occidentalis* (western snowberry), *Rosa woodsii* (woods rose), *Crataegus douglasii* (black hawthorn), and *Poa pratensis* (Kentucky bluegrass) to dominate. In fact, many of the sites that support the *Acer negundo/Prunus virginiana* (box-elder/common choke-cherry) habitat type in the northern Great Plains of Montana are in this state or in the severe overgrazed state.

When a stand is at this severely degraded stage, the prospect of returning the site to its former state is very difficult if not impossible. (Restoration would be extremely expensive in terms of both labor and money.) Therefore, if a manager wants to maintain the stand of trees, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Soils of this habitat type are characteristic of floodplains, with the upper horizon dominated by alluvial sands, silts, and clays. Surface soils, up to 75 cm (30 in) deep, are generally silt loams, clay loams, or sandy clay loams. Fine or coarse sands, often intermixed with bands or pockets of small, medium, and large gravels and cobbles, are present in underlying layers 45 cm (18 in) or more deep, and occasionally reaching depths of 150 cm (60 in). Gravels, cobbles, and rocks form a matrix at the lowest level. Soils tend to be well-drained and may be exposed to infrequent flooding. Hansen and others (1995) note that *Acer negundo* (box-elder) is very tolerant to prolonged flooding. Leaf litter layers may accumulate to 5 cm (2 in) at locations where flooding is less frequent. Water tables often occur just below the surface, but may reach depths of 90 cm (36 in) or more.

ADJACENT COMMUNITIES

Acer negundo (box-elder) often forms a mosaic pattern along stream corridors with the *Betula occidentalis* (water birch), *Acer grandidentatum* (bigtooth maple), and various willows and *Populus* (cottonwood) community types. When present, *Acer negundo* (box-elder) is the dominant species on the site, but one or more of these associated shrub communities may occur in the understory with significant canopy coverage. *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper) savannas occupy adjacent uplands. Wetter sites are dominated by bulrushes, sedges, and *Phalaris arundinacea* (reed canarygrass).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated (Hansen and others 1995).

On relatively undisturbed sites, dense stands of the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type limit access by livestock. As the stands open up, livestock use may go up proportionally. This habitat type is valuable to livestock managers because of the following benefits they provide: 1) thermal cover (shade), 2) water source, 3) palatable forage, 4) protection from seasonal storms, and 5) calving grounds. Because the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type covers a small portion of the landscape and because of their high wildlife value (see the Wildlife section), these sites are becoming focal points for livestock and wildlife management conflicts in this region (Hansen and others 1995).

Livestock managers should reduce or eliminate hot season use in this type. This can be accomplished by placing salt blocks on the uplands away from the woody draws, moving water sources out of the draws, and in some instances, by using cross fences (or drift fences) that are placed perpendicular to the linear stand at appropriate intervals. This method is most appropriate for those stands located in V-shaped draws or ravines. These short fences will discourage livestock from trailing down the center of the stand. In disturbed sites, it may be necessarily to fence out a portion of the stand for a period of five or more years in order to allow regeneration by the tree and shrub species. After the appropriate time frame, the fence could be moved to a different portion of the stand (Hansen and others 1995).

The use of these sites as winter feeding grounds can have a variety of results. In many instances, proper winter use will have minimal impacts on the stand. However, if livestock numbers are high, trampling and rubbing can have a detrimental impact on the woody species. If livestock use is high when the frost melts, softening the ground, a great deal of soil churning and compaction can occur (Hansen and others 1995).

The high values associated with the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type should elicit special consideration by livestock operators.

Wildlife

In the arid portions of southeastern and central Idaho, woody draws are very important to wildlife even though they represent a very small fraction of the total area (around 1-2 percent of the total landscape). Located in areas of greater than normal moisture, they are more productive than the surrounding upland vegetation (Thomas and others 1979). Woody draws attract wildlife for thermal cover, nesting habitat, water source, late summer and winter forage, travel corridors, and hiding cover (Ames 1977, Hansen and others 1984, Hansen and

Hoffman 1988, Severson and Boldt 1978). Woody draws are an important year round habitat for mule deer, provides critical winter habitat for whitetail deer (Severson and Carter 1978, Swenson 1981), and is an important fawning area for both whitetail and mule deer. During fall and winter, woody draws provide critical habitat for sharptailed grouse (Hansen and others 1995).

Woody draws provide essential habitat for a large number of non-game species. Grosz and others (1981) found that this habitat type is the center of activity for many species and is of critical importance to many species during the stressful winter months. They also found that these sites support a greater diversity and density of birds when compared to adjacent uplands. In northwestern North Dakota, Hopkins (1985) censused species of birds nesting in woody draws and found that although they had lower species diversity than cottonwood forests, the *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type documented by Hansen and others 1995, which is similar to the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type described here, supported a much higher density of breeding pairs. Finally, these woody draws provide important habitat for such nongame mammals as coyote, weasel, bobcat, and red fox (Swenson 1981, Sieg and others 1985).

If the long term management objective is the maintenance of the tree stand on the site, then managers need to key in on the seedling reproduction by *Acer negundo* (box-elder) or the stand will eventually be eliminated.

Fisheries
The woody species associated with the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type provide valuable streambank stability and thermal cover for many species of fish.

Fire
Acer negundo (box-elder) and most of the important shrub species in the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type produce sprouts from the root crown when the main trunk is damaged. The ability of the woody species to sprout prolifically suggests that this habitat type is adapted to fire and perhaps to periodic stand regeneration by fire. However, the role of fire in this habitat type is not well documented (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Sites adjacent to streams are extremely vulnerable to streambank sloughing, particularly when soils are moist. Excessive livestock use will increase levels of soil compaction and decrease stability. Management should emphasize the importance of the understory shrub communities for streambank stabilization (Hansen and others 1995).

Where revegetation with woody species is desired, *Cornus stolonifera* (red-osier dogwood), *Acer negundo* (box-elder), *Prunus virginiana* (common choke-cherry), and *Ribes odoratum* (buffalo currant) are well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are moderate to rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995)

Care must be taken when locating structures within this type due to flood hazard.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Hansen and others (1995) document an *Acer negundo/Prunus virginiana* (box-elder/common chokecherry) habitat type for the Northern Great Plains of Montana. A somewhat similar community type was described by Szaro (1989) for riparian and wetland sites in Arizona and New Mexico.

Elaeagnus angustifolia Community Type (Russian Olive Community Type)

ELAANG (ELAN)
Number of Stands Sampled = 9

LOCATION AND ASSOCIATED LANDFORMS

The *Elaeagnus angustifolia* (Russian olive) community type is a minor type at low elevations in southern and eastern Idaho Sites range from 909 to 1,340 m (3,000 to 4,422 ft). This community type typically forms stringer communities on upper floodplain terraces adjacent to streams and rivers at the bottom of deep canyons. It may also be found in low depressional areas capable of retaining water near the surface for much of the year, especially potholes, elevated seep areas, and abandoned river oxbows. If sufficient water is present near the surface, *Elaeagnus angustifolia* (Russian olive) may form dense forests on broad floodplains of major rivers, such as the Snake River.

VEGETATION

Elaeagnus angustifolia (Russian olive), a tree native to southern Europe and western Asia, was introduced into North America during colonial times (Elias 1980). *Elaeagnus angustifolia* (Russian olive) was planted in shelterbelts throughout the prairie states and provinces due to its dense growth form, hardiness, and adaptability to a wide range of soil and moisture conditions (Olson and Knopf 1986). It has also been used for ornamental and wildlife habitat plantings, erosion control, and highway beautification (Christensen 1963). Currently, *Elaeagnus angustifolia* (Russian olive) has naturalized throughout the 17 western states bounded on the east by North and South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Personal observations and a review of the literature indicate that *Elaeagnus angustifolia* (Russian olive) naturalization is rapidly increasing, especially in the riparian zone. The potential impacts of the spread of *Elaeagnus angustifolia* (Russian olive) to floodplain forests are substantial. Even though *Elaeagnus angustifolia* (Russian olive) may have a high value for wildlife, it can interfere with agricultural practices and has the potential to displace native riparian or wetland vegetation. In fact, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

Elaeagnus angustifolia (Russian olive) spreads from introduced plantings with the help of birds, and to a lesser degree, small mammals (Olson and Knopf 1986). The seeds, ingested with the fruits, pass through the digestive tract of birds and may be deposited in new locations. Small mammals help spread the seeds by building food caches, sometimes up to 150 m (approx. 450 ft) from the original sources.

Two conditions that tend to favor the establishment of *Elaeagnus angustifolia* (Russian olive) are spring moisture and slightly alkaline soil (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000 ppm) salt concentrations.

Elaeagnus angustifolia (Russian olive) has a dense growth form and tolerates a wide range of temperature, soil, and moisture conditions (Borell 1976, Elias 1980). Stands in Idaho may be associated with *Populus trichocarpa* (black cottonwood) and Populus *angustifolia* (narrowleaf cottonwood). *Elaeagnus angustifolia* (Russian olive) communities are quite variable, establishing as open stands with widely spaced individuals on some locations, and dense forests in other areas. The shrub component may be sparse or robust depending on local site factors, and may include willows, *Rosa woodsii* (woods rose), hawthorn, and *Ribes* (currant). Graminoids, particularly *Bromus tectorum* (cheatgrass), *Hordeum jubatum* (foxtail barley), and *Poa pratensis* (Kentucky bluegrass), may dominate the herbaceous understory, forming a dense root network at the surface. The remainder of the herbaceous component can include *Scirpus* (bulrush) and cattail on wet sites and *Arctium minus* (common burdock) and *Chenopodium album* (lambsquarter) on drier sites (Table 19).

Table 19. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Elaeagnus angustifolia* (Russian olive) community type (number = 9 stands)

Species	% Can. Cov. Avg.	 Rng.	Con.
Trees			
Elaeagnus angustifolia (Russian olive)	82	60-90	100
Shrubs			
Ribes odoratum (buffalo currant)	14	0-30	67
Rosa woodsii (woods rose)	2	0-3	67
Solanum dulcamara (climbing nightshade)	13	0-30	67
Graminoids			
Bromus tectorum (cheatgrass)	24	0-40	67
Dactylis glomerata (orchard-grass)	21	0-60	33
Hordeum jubatum (foxtail barley)	10	0-20	33
Poa pratensis (Kentucky bluegrass)	22	0-60	67
Forbs			
Arctium minus (common burdock)	11	0-20	33
Chenopodium album (lambsquarter)	21	0-30	44
Cirsium arvense (Canada thistle)	8	0-20	33
Cirsium vulgare (bull thistle)	5	0-10	33
Cynoglossum officinale (common hound's-tongue)	4	0-10	44
Galium aparine (goose-grass)	5	0-10	33
Lactuca serriola (prickly lettuce)	5	0-10	33
Sisymbrium loeselii (Loeselii tumblemustard)	5	0-10	33
Urtica dioica (stinging nettle)	8	0-20	33

SUCCESSIONAL INFORMATION

The *Elaeagnus angustifolia* (Russian olive) community type may represent a seral stage of the *Acer negundo/ Cornus stolonifera* (box-elder/red-osier dogwood) habitat type or the *Fraxinus pennsylvanica/ Prunus virginiana* (green ash/common chokecherry) habitat type in southern and eastern Idaho. *Populus trichocarpa* (black cottonwood), willows, and hawthorn may act as earlier seral communities to the *Elaeagnus angustifolia* (Russian olive) community type.

SOILS

Hansen and others (1995) indicate that soils are generally Entisols (Torrifluvents) or Mollisols (Haploborolls and Argiborolls). Soil texture ranges from clay loam to sandy loam. Water tables are generally near the soil surface during spring runoff or after storm events, but may fall below 1 m (39 in) during dry periods. These sites experience periodic flooding but duration is usually brief. Where flooding is more infrequent, twig and leaf litter layer accumulation may reach 5-7.5 cm (2-3 in).

As discussed earlier, two situations that appear to favor the establishment of *Elaeagnus angustifolia* (Russian olive) seedlings are favorable spring moisture and slightly alkaline soils (Olson and Knopf 1986). Carmen and Brotherson (1982) reported that *Elaeagnus angustifolia* (Russian olive) preferred sites with low to medium concentrations (100-3,500 ppm) of soluble salts, whereas *Tamarix chinensis* (salt cedar) occurred on sites of higher (700-15,000 ppm) salt concentrations.

ADJACENT COMMUNITIES

Cottonwoods, willows, or hawthorn communities often occupy associated riparian zones. Saturated sites may be dominated by cattail, bulrushes, and *Phalaris arundinacea* (reed canarygrass). Adjacent upland communities include mixed grasslands. *Ribes* (currants and gooseberries) dominated thickets, or *Artemisia tridentata* (big sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Open stands of *Elaeagnus angustifolia* (Russian olive) may offer moderate to high grazing potential for livestock, especially where the understory is dominated by graminoids; however, spines prevalent on branches throughout the canopy may act as a deterrent where stands are more densely clustered (Hansen and others 1995).

Wildlife

The high structural diversity of the *Elaeagnus angustifolia* (Russian olive) community type provides excellent thermal and hiding cover, but provides only limited forage for wildlife species. The fruits of *Elaeagnus angustifolia* (Russian olive) are eaten by pheasants, sharp-tailed grouse, squirrels, raccoons, whitetail deer, and a variety of nongame birds such as flickers, grosbeaks, warblers, and flycatchers. In southeastern Oregon, beaver have used *Elaeagnus angustifolia* (Russian olive) for dam material (Olson and Knopf 1986). However, the displacement of native floodplain forests by *Elaeagnus angustifolia* (Russian olive) can result in a 30 percent reduction of breeding bird species (Knopf 1991).

Elaeagnus angustifolia (Russian olive) stands can interfere with farming operations. They also hinder management activities on national wildlife refuges and occasionally block irrigation canals (Olson and Knopf 1986). Once established, *Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a management concern for both public agencies and private landowners (Hansen and others 1995). Future use of this species as a wildlife habitat should be eliminated. In fact, many agencies now consider *Elaeagnus angustifolia* (Russian olive) an invasive, weedy species that should be eradicated.

Fisheries

Elaeagnus angustifolia (Russian olive) enhance fisheries by stabilizing streambanks, providing cover and moderating temperature highs during summer months. However, future use of this species as a wildlife habitat should be eliminated. In fact, many agencies now consider *Elaeagnus angustifolia* (Russian olive) an invasive, weedy species that should be eradicated.

Soil Management and Rehabilitation Opportunities

During spring runoff or after storm events when water tables are high, these soils are most susceptible to compaction by vehicular traffic or livestock. Sites with well-drained soils and coarse textures are less susceptible to compaction, yet activities should be scheduled to avoid high water periods (Hansen and others 1995).

Considering its adaptability and resistance to control efforts, *Elaeagnus angustifolia* (Russian olive) has become a major management concern for both public agencies and private landowners. As indicated earlier, once established, *Elaeagnus angustifolia* (Russian olive) is difficult to control and nearly impossible to eradicate. Efforts to control unwanted stands have included mowing seedlings, cutting, burning, spraying, girdling, and bulldozing. Therefore, the planting of *Elaeagnus angustifolia* (Russian olive) should be eliminated due to the aggressive nature of *Elaeagnus angustifolia* (Russian olive) and the inevitable costs that will be associated with the long-term control of this species (Hansen and others 1995). Future use of this species as a wildlife habitat should be eliminated. In fact, many agencies now consider *Elaeagnus angustifolia* (Russian olive) an invasive, weedy species that should be eradicated.

Recreational Uses and Considerations
The *Elaeagnus angustifolia* (Russian olive) community type provides excellent opportunities for observing a variety of wildlife including big game, small mammals, songbirds, and upland game birds. In the spring, the flowers of *Elaeagnus angustifolia* (Russian olive) are quite fragrant (Hansen and others 1995). However, future use of this species as a wildlife habitat should be eliminated. In fact, many agencies now consider *Elaeagnus angustifolia* (Russian olive) an invasive, weedy species that should be eradicated.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

The *Elaeagnus angustifolia* (Russian olive) community type was described by Hansen and others (1995) for Montana.

Populus angustifolia/Cornus stolonifera Community Type (Narrowleaf Cottonwood/Red-Osier Dogwood Community Type)

POPANG/CORSTO (POAN3/COST4)
Number of Stands Sampled = 24

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. However, this trend has not yet been established for sites in Idaho.

VEGETATION

Populus angustifolia (narrowleaf cottonwood) forms a thick canopy over a dense shrub understory. Associated tree species, *Elaeagnus angustifolia* (Russian olive), *Acer negundo* (box-elder), and *Populus trichocarpa* (black cottonwood), are occasionally present in trace amounts. The shrub understory may be extensive, and is generally dominated by *Cornus stolonifera* (red-osier dogwood), with lesser amounts of *Elaeagnus commutata* (silverberry), *Rosa woodsii* (woods rose), and willows. Common herbaceous species include *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Solidago canadensis* (Canada goldenrod), and *Smilacina stellata* (starry Solomon-plume); however, the herbaceous layer may be sparse and exhibit low vigor due to the substantial shrub component (Table 20).

Table 20. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 4 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Populus angustifolia (narrowleaf cottonwood)	50	40-60	100
Populus trichocarpa (black cottonwood)	3	0-3	25
Salix amygdaloides (peach-leaf willow)	3	0-3	25
Shrubs			
Cornus stolonifera (red-osier dogwood)	45	40-60	100
Ribes species (currant; gooseberry)	1	0-1	25
Rosa acicularis (prickly rose)	20	0-20	25
Rosa species (rose)	20	0-20	25
Rosa woodsii (woods rose)	12	0-20	50
Rubus idaeus (red raspberry)	3	0-3	25
Salix exigua (sandbar willow)	22	0-40	50
Salix lasiandra (Pacific willow)	3	0-3	25
Symphoricarpos occidentalis (western snowberry)	7	1-20	100
Graminoids			
Agrostis species (bentgrass)	20	0-20	25
Agrostis stolonifera (redtop)	36	3-60	100
Carex lanuginosa (woolly sedge)	3	0-3	25
Elymus virginicus (Virginia wildrye)	3	0-3	25
Phalaris arundinacea (reed canarygrass)	12	0-20	50
Phleum pratense (common timothy)	3	0-3	25
Poa pratensis (Kentucky bluegrass)	14	0-20	75
Forbs			
Achillea millefolium (common yarrow)	1	0-1	25

Table 20 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Apocynum cannabinum (hemp dogbane)	3	0-3	25
Cirsium arvense (Canada thistle)	14	0-20	75
Geum macrophyllum (larged-leaved avens)	1	0-1	25
Glycyrrhiza lepidota (American licorice)	20	0-20	25
Heracleum lanatum (cow-parsnip)	20	0-20	25
Humulus lupulus (common hop)	1	0-1	25
Lysimachia ciliata (fringed loosestrife)	3	0-3	25
Mentha arvensis (field mint)	3	0-3	50
Rumex crispus (curly dock)	3	0-3	25
Smilacina stellata (starry Solomon-plume)	3	0-3	25
Solidago canadensis (Canada goldenrod)	12	0-20	50
Solidago species (goldenrod)	3	0-3	25
Taraxacum officinale (common dandelion)	1	0-1	25
Urtica dioica (stinging nettle)	3	0-3	25
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	25

SUCCESSIONAL INFORMATION

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/ Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/ red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* species (spruce), *Pseudotsuga menziesii* (Douglas fir), or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type.

If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* species (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

Table 21. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type (number = 20 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Elaeagnus angustifolia (Russian olive)	2	0-3	10
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	15
Pinus flexilis (limber pine)	3	0-3	5
Populus angustifolia (narrowleaf cottonwood)	65	40-90	100
Populus trichocarpa (black cottonwood)	14	0-20	15
Shrubs			
Alnus incana (mountain alder)	3	0-3	5
Amelanchier alnifolia (western serviceberry)	2	0-3	15
Artemisia tridentata (big sagebrush)	1	0-1	5
Betula occidentalis (water birch)	20	0-20	10
Clematis ligusticifolia (western virgins-bower)	8	0-20	40
Cornus stolonifera (red-osier dogwood)	31	3-80	100
Crataegus douglasii (black hawthorn)	2	0-3	10
Elaeagnus commutata (silverberry)	10	0-20	45
Juniperus horizontalis (creeping juniper)	1	0-1	5
Lonicera involucrata (twin-berry)	1	0-1	10
Prunus virginiana (common.chokecherry)	1	0-1	10
Rhus aromatica (fragrant sumac)	2	0-3	15
Ribes species (currant; gooseberry)	1	0-1	10
Ribes lacustre (swamp currant)	1	0-1	15
Ribes setosum (Missouri gooseberry)	1	0-1	5
Rosa acicularis (prickly rose)	40	0-40	5
Rosa woodsii (woods rose)	23	0-70	70
Rubus idaeus (red raspberry)	1	0-1	5
Salix exigua (sandbar willow)	12	0-30	15
Salix lasiandra (Pacific willow)	40	0-40	5
Salix lutea (yellow willow)	10	0-20	40

Table 21 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Symphoricarpos albus (common snowberry)	2	0-3	20
Symphoricarpos occidentalis (western snowberry)	34	0-60	25
Graminoids			
Aegilops cylindrica (goatgrass)	1	0-1	5
Agropyron repens (quackgrass)	20	0-20	5
Agropyron smithii (western wheatgrass)	3	0-3	10
Agrostis stolonifera (redtop)	21	0-70	70
Alopecurus pratensis (meadow foxtail)	10	0-10	5
Bromus anomalus (nodding brome)	1	0-1	10
Bromus inermis (smooth brome)	1	0-1	5
Bromus species (brome)	10	0-10	5
Calamagrostis species (reedgrass)	1	0-1	5
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	5
Dactylis glomerata (orchard-grass)	21	0-40	10
Eleocharis compressa (flatstem spike-rush)	3	0-3	5
Elymus virginicus (Virginia wildrye)	1	0-1	10
Grass	1	0-1	5
Hordeum jubatum (foxtail barley)	3	0-3	5
Phalaris arundinacea (reed canarygrass)	11	0-20	10
Phleum pratense (common timothy)	7	0-10	10
Poa palustris (fowl bluegrass)	3	0-3	5
Poa pratensis (Kentucky bluegrass)	36	0-80	85
Stipa viridula (Green Needlegrass)	1	0-1	5
Forbs			
Achillea millefolium (common yarrow)	1	0-1	10
Agastache urticifolia (nettle-leaf giant-hyssop)	3	0-3	5
Apocynum cannabinum (hemp dogbane)	3	0-3	5
Arctium minus (common burdock)	1	0-1	10
Artemisia ludoviciana (prairie sagewort)	1	0-1	10
Centaurea maculosa (spotted knapweed)	1	0-1	5
Cirsium arvense (Canada thistle)	16	0-60	45
Cirsium vulgare (bull thistle)	2	0-3	10
Cynoglossum officinale (common hound's-tongue)	3	0-3	5
Erigeron glabellus (smooth daisy)	1	0-1	5
Forb	1	0-1	10
Galium triflorum (sweetscented bedstraw)	4	0-10	35
Glycyrrhiza lepidota (American licorice)	13	0-30	35
Heracleum lanatum (cow-parsnip)	1	0-1	5
Lactuca serriola (prickly lettuce)	3	0-3	5
Lactuca species (lettuce)	1	0-1	5
Lithospermum ruderale (western gromwell)	1	0-1	5
Medicago sativa (alfalfa)	10	0-10	5
Melilotus alba (white sweet-clover)	2	0-3	10
Melilotus officinalis (yellow sweet-clover)	1	0-1	5
Mentha arvensis (field mint)	3	0-3	5
Osmorhiza chilensis (mountain sweet-cicely)	2	0-3	10
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	5
Plantago major (common plantain)	3	0-3	5
Rudbeckia laciniata (tall coneflower)	20	0-20	5
Rumex crispus (curly dock)	1	0-1	5
Smilacina stellata (starry Solomon-plume)	10	0-40	60
Solidago canadensis (Canada goldenrod)	7	0-10	40
Solidago gigantea (late goldenrod)	3	0-3	5
Solidago missouriensis (Missouri goldenrod)	3	0-3	5
Solidago occidentalis (western goldenrod)	2	0-3	10
Stachys palustris (swamp hedge-nettle)	1	0-1	5
Taraxacum officinale (common dandelion)	5	0-20	40
Tragopogon dubius (goat's beard)	1	0-1	10
Trifolium dubium (least hop clover)	7	0-30	25
Trifolium species (clover)	1	0-1	5
Urtica dioica (stinging nettle)	3	0-3	5
Vicia americana (American vetch)	1	0-1	5
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	4	0-20	35

SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of sands, gravels, and cobbles occupies the zone below this horizon. Substrates tend to be well-drained, and are prone to flooding where sites occur on active floodplains and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. Fluctuating water tables increase the potential for oxidation/reduction processes, as indicated by mottled or gleyed soil characteristics. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance. Hansen and others (1995) indicate that soils for this community type are classified as Inceptisols, Entisols, or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), and *Salix lasiandra* (Pacific willow) represent scattered communities found along abandoned oxbows and riverbanks. The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type or the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on adjacent disturbed sites, while the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on newly deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Clematis ligusticifolia* (western virgins-bower), *Elaeagnus commutata* (silverberry), *Rhus aromatica* (fragrant sumac) and *Rosa woodsii* (woods rose) as the dominant understory. At this point, the stand has been converted to the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) disturbance-caused community type. If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) disturbance-caused community type (Hansen and others 1995).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future timber potential is lost.

Wildlife

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The streamside location of this *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance cannot be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fire and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities
Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the site still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the site. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures on active floodplains due to flood hazard.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community was described by and Hansen and others (1995) for Montana. A similar community type was documented by Youngblood and others (1985b) for eastern Idaho and western Wyoming and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Populus angustifolia/Herbaceous Community Type (Narrowleaf Cottonwood/Herbaceous Community Type)

POPANG (POAN3)
Number of Stands Sampled = 30

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a major type at low to mid elevations in eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. However, this trend has not been established for sites in Idaho.

VEGETATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type is a grazing or browsing disclimax of the *Populus angustifolia*/*Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Stands are two-tiered, characterized by mature, widely spaced *Populus angustifolia* (narrowleaf cottonwood) in the overstory and herbaceous species, such as *Poa pratensis* (Kentucky bluegrass) and *Agropyron smithii* (western wheatgrass), dominating the understory. The forb component may be represented by *Lupinus argenteus* (silvery lupine), *Trifolium dubium* (least hop clover), and *Solidago occidentalis* (western goldenrod). Disturbance tolerant shrub species, commonly *Crataegus douglasii* (black hawthorn) or *Rosa woodsii* (woods rose), are generally absent or present with low coverages (Table 22).

Table 22. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type (number = 30 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Trees			
Populus angustifolia (narrowleaf cottonwood)	39	10-90	100
Shrubs			
Elaeagnus commutata (silverberry)	8	0-20	27
Graminoids			
Agropyron smithii (western wheatgrass)	13	0-40	33
Dactylis glomerata (orchard-grass)	19	0-40	27
Poa pratensis (Kentucky bluegrass)	29	0-98	87
Forbs			
Lupinus argenteus (silvery lupine)	3	0-10	33
Solidago occidentalis (western goldenrod)	3	0-10	37
Tragopogon dubius (goat's beard)	1	0-1	30
Trifolium dubium (least hop clover)	8	0-30	40

SUCCESSIONAL INFORMATION

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-seral *Populus angustifolia*/*Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that require moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen and others 1985).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/ Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* species (spruce), *Pseudotsuga menziesii* (Douglas fir), or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/ red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/ Symphoricarpos occidentalis* (narrowleaf cottonwood/ western snowberry) community type.

If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* species (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/ Herbaceous [narrowleaf cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of sands, gravels, and cobbles occupies the zone below this horizon. Substrates tend to be well-drained, and are prone to flooding where sites occur on active floodplains and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. Fluctuating water tables increase the potential for oxidation/reduction processes, as indicated by mottled or gleyed soil characteristics. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance. Hansen and others (1995) indicate that soils for this community type are classified as Inceptisols, Entisols, or Mollisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), and *Salix lasiandra* (Pacific willow) represent scattered communities found along abandoned oxbows and riverbanks. The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may occur on moderately disturbed sites. The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) and mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), *Phleum pratense* (common timothy), and a variety of "weedy" forbs. This community type is commonly used as a winter feeding ground by ranchers. *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), and *Phleum pratense* (common timothy) are palatable and moderately productive grasses, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future gallery forest potential is lost.

Wildlife

This type is a source of early spring forage for moose, deer, and elk. Cover value is limited because of the typically open, two layered structure. Birds are common, and larger cottonwoods provide nest sites. Large accipiters and cavity nesters may inhabit this type (Youngblood and others 1985b). Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible. Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

Fisheries

The streamside location of this type is important in providing thermal cover, debris recruitment, and streambank stability. However, the reestablishment of the shrub layer will offer greater bank stability and cover, further enhancing the existing conditions (Hansen and others 1995).

Fire

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities
Coarse textured soils are not as susceptible to compaction problems. However, this community type is subject to recurring scouring by floods and alluvium deposition. Management should emphasize the importance of restoring the deep-rooted understory shrub layer along streambanks for stabilization purposes. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters. If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands with fire, see the discussion on limitations in the Fire Management section. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game and waterfowl hunting, and observing a variety of bird species.

Care must be taken when locating structures on active floodplains due to flood hazard

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community was described by and Hansen and others (1995) for Montana. A similar community type was identified by Youngblood and others (1985b) for eastern Idaho and western Wyoming, by Padgett and others (1989) for Utah and southeastern Idaho, and by Chadde and others (1988) for northern Yellowstone National Park. A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Populus angustifolia/Recent Alluvial Bar Community Type (Narrowleaf Cottonwood/Recent Alluvial Bar Community Type)

POPANG (POAN3)
Number of Stands Sampled= 8

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an incidental type at low to mid elevations in southern and eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. Seedlings germinate on point bars, side bars, mid channel bars, and delta bars, requiring unvegetated, barren sites composed of sands, cobbles, and/or gravels, and water levels at or near the surface. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (Black cottonwood) in Montana. However, this trend has not yet been established for sites in Idaho.

VEGETATION

This type is characterized by a stand dominated by seedlings or saplings of *Populus angustifolia* (narrowleaf cottonwood), or a stand codominated by cottonwoods and *Salix exigua* (sandbar willow). *Populus trichocarpa* (black cottonwood) may be present, but is subordinate to *Populus angustifolia* (narrowleaf cottonwood). The understory is vegetated by an assortment of grasses and forbs such as *Agrostis stolonifera* (redtop), *Agropyron caninum* (bearded wheatgrass), *Phleum pratense* (common timothy), and *Artemisia dracunculus* (tarragon) (Table 23).

Table 23. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type that are relatively undisturbed by livestock or wildlife (number = 8 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus angustifolia (narrowleaf cottonwood)	23	3-40	100
Shrubs			
Artemisia tridentata (big sagebrush)	1	0-1	25
Dryas drummondii (yellow mountain-avens)	30	0-40	25
Salix exigua (sandbar willow)	34	0-80	38
Salix lutea (yellow willow)	1	0-1	25
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	50
Agrostis stolonifera (redtop)	9	0-20	63
Koeleria cristata (prairie junegrass)	1	0-1	25
Phleum pratense (common timothy)	2	0-3	63
Trisetum wolfii (Wolf's trisetum)	1	0-1	25
Forbs			
Achillea millefolium (common yarrow)	1	0-1	25
Arabis species (rockcress)	1	0-1	25
Artemisia dracunculus (tarragon)	5	0-10	38
Aster chilensis (long-leaved aster)	2	0-3	25
Aster occidentalis (western aster)	1	0-1	25
Astragalus species (milk-vetch; orophaca)	1	0-1	25
Chrysopsis villosa (hairy golden-aster)	2	0-3	25
Sedum lanceolatum (lance-leaved stonecrop)	1	0-1	25
Solidago canadensis (Canada goldenrod)	1	0-1	38
Solidago missouriensis (Missouri goldenrod)	3	0-3	25
Trifolium repens (white clover)	7	0-20	38

SUCCESSIONAL INFORMATION

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type represents an early seral (pioneer) stage of primary succession.

Primary Successional Stages
Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since

cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and other 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). Near the foothills, the understory may be dominated by *Acer negundo* (box-elder). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers, or *Acer negundo* (box-elder) are ready to replace them (Hansen and other 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. At lower elevations, in the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At higher elevations, succession may progress to the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type. In the foothills, succession continues to the *Acer negundo/Cornus stolonifera (box-elder/red-osier dogwood) habitat type*, or the *Juniperus scopulorum/ Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. In other instances, this community type may be successional to the *Salix geyeriana/ Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation (Hansen and other 1995).

Secondary Successional Stages

The normal primary successional sequence (described above) may be altered due to varying degrees of grazing and browsing pressures. Moderate, prolonged grazing and browsing pressures will cause a stand to progress to the disturbance-caused *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type. Severe, prolonged grazing and browsing pressures may eliminate all conifer and/or deciduous seedlings and may eliminate the undergrowth of shrub species as well. This severely disturbed stage of secondary succession is called the *Populus angustifolia/* Herbaceous (narrowleaf cottonwood/herbaceous) community type. In this situation, the overstory of *Populus angustifolia* (narrowleaf cottonwood) still matures and becomes open with an understory dominated by herbaceous species. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types (Hansen and other 1995).

Stands of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type are very susceptible to the natural dynamics of a river system and may be flooded and eliminated after just a year or two of growth. Ice can also have a dramatic impact on these recently deposited alluvial bars. Ice can influence the floodplain landscape by either one of two ways: 1) mechanical damage, or 2) flooding (inundation). Mechanical damage generally involves the following: a) the laying down or bending over of the younger cottonwoods, b) the physical shearing off of the stems, c) the actual pulling out of the ground by the ice that surrounds the main stems, and d) the tilting or pushing over of mature trees. Young cottonwood seedlings and saplings are very susceptible to defoliation by livestock. If livestock pressures are too great, the stand can be either partially or totally eliminated. In many situations, excessive livestock pressure has eliminated the establishment of new cottonwood stands. Beaver and big game species can also have a dramatic impact on newly established cottonwood stands (Hansen and other 1995).

SOILS

Populus angustifolia (narrowleaf cottonwood) generally occurs along streams with large amounts of coarse substrates such as cobbles and gravels. Soils are typically Entisols (Fluvents) with up to 1 m (39 in) of mineral soil overlying river gravel and/or cobbles. Soil texture varies from loam to coarse sand. Water tables are generally at or near the soil surface. In late summer, water tables may drop below 50 cm (20 in) of the soil surface but surface horizons remain moist due to capillary action. Soils are well-drained with low available water. Coarse textured soils, moderate stream gradients, and high coarse fragment contents throughout the soil profile provide an environment that produces a rapid movement of highly aerated groundwater. This type of substrate is important to many floodplain communities (Hansen and other 1995).

ADJACENT COMMUNITIES

Adjacent wetter communities include the *Salix exigua* (sandbar willow) community type. Stands of *Salix amygdaloides* (peach-leaf willow) and *Salix lasiandra* (Pacific willow) may border this type. Adjacent undisturbed sites may contain the *Populus angustifolia*/*Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. The *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type or the *Populus angustifolia*/*Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type may be present on disturbed sites. Nearby uplands are dominated by *Artemisia tridentata* (big sagebrush) shrublands and mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. Stands in good to excellent health (condition) often support dense thickets of cottonwoods and associated shrub species thereby limiting the amount of available forage. These stands are very susceptible to defoliation by livestock. If establishment of new cottonwood stands is a management objective, livestock impacts should be closely monitored. In some situations, it may be advisable to eliminate livestock use until the cottonwoods are of sufficient height to preclude defoliation by livestock (Hansen and other 1995).

Wildlife

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. *Populus angustifolia* (narrowleaf cottonwood) is used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The streamside location of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is valuable for fisheries by providing streambank stability (Hansen and other 1995).

Fire

The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is susceptible to fire. In general, cottonwood seedlings, and to a lesser degree cottonwood saplings, do not have an extensive root system or thick bark and may be severely damaged (or eliminated) by fire (Hansen and other 1995).

Soil Management and Rehabilitation Opportunities

The coarse textured substrates are not susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters.

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species. However, the dense nature of many of these stands may preclude various types of recreational activities such as fly fishing (Hansen and other 1995).

Care must be taken when locating structures within this type. Some campgrounds in Montana have been seriously damaged by floods or lost altogether.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

This type has been documented in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

Populus angustifolia/Symphoricarpos occidentalis Community Type (Narrowleaf Cottonwood/Western Snowberry Community Type)

POPANG/SYMOCC (POAN3/SYOC)
Number of Stands Sampled = 16

LOCATION AND ASSOCIATED LANDFORMS

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is a minor type at low to mid elevations in southern and eastern Idaho, ranging from 1,455 to 2,061 m (4,800 to 6,800 ft). *Populus angustifolia* (narrowleaf cottonwood) tends to occupy broad, level floodplains and islands associated with major stream and river systems. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus angustifolia* (narrowleaf cottonwood) generally occurs at lower elevations than *Populus trichocarpa* (black cottonwood) in Montana. However, this trend has not been established for sites in Idaho.

VEGETATION

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is a grazing disclimax. *Populus angustifolia* (narrowleaf cottonwood) dominates the overstory, with the occasional presence of *Juniperus scopulorum* (Rocky Mountain juniper), and *Populus trichocarpa* (black cottonwood). The shrub component is comprised of *Crataegus douglasii* (black hawthorn), *Rosa woodsii* (woods rose), *Elaeagnus commutata* (silverberry), *Rhus aromatica* (fragrant sumac), *Clematis ligusticifolia* (western virgins-bower), and other disturbance tolerant shrubs. The herbaceous understory generally consists of disturbance-induced species as well, notably, *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), and *Taraxacum officinale* (common dandelion) (Table 24). Although *Symphoricarpos occidentalis* (western snowberry) is the diagnostic species for this type, it may not be well represented in some communities along the South Fork of the Snake River and other locations in Idaho.

Table 24. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type that are relatively undisturbed by livestock or wildlife (number = 16 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	2	0-3	38
Populus angustifolia (narrowleaf cottonwood)	56	20-98	100
Shrubs			
Clematis ligusticifolia (western virgins-bower)	15	0-40	63
Elaeagnus commutata (silverberry)	49	0-90	44
Rhus aromatica (fragrant sumac)	46	0-80	31
Rosa woodsii (woods rose)	8	0-20	44
Graminoids			
Agrostis stolonifera (redtop)	5	0-20	38
Poa pratensis (Kentucky bluegrass)	47	0-90	94
Forbs			
Cynoglossum officinale (common hound's-tongue)	6	0-10	25
Glycyrrhiza lepidota (American licorice)	7	0-20	31
Smilacina stellata (starry Solomon-plume)	4	0-10	25
Solidago canadensis (Canada goldenrod)	4	0-10	31
Taraxacum officinale (common dandelion)	3	0-10	25
Trifolium dubium (least hop clover)	6	0-20	31

SUCCESSIONAL INFORMATION

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type represents a moderately disturbed secondary successional stage of the mid-seral *Populus angustifolia/ Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that require moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus angustifolia* (narrowleaf cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus angustifolia* (narrowleaf cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type (Hansen and others 1995).

Secondary Successional Stages
The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus angustifolia* (narrowleaf cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* species (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac), *Elaeagnus commutata* (silverberry), and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type.

If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* species (brome), and a variety of "weedy" forbs (e.g., the *Populus angustifolia*/Herbaceous [narrowleaf cottonwood/ Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Hansen and others (1995) indicate that soils for this community type are classified as Inceptisols, Entisols, or Mollisols. Alluvial soils are generally fine textured, primarily silt but with moderate quantities of clay and fine grain sand. This layer may be as shallow as 5 cm (2 in) but may extend to depths of 60 cm (24 in) or more. A matrix of sands, gravels, and cobbles occupies the zone below this horizon. Substrates tend to be well-drained, and are prone to flooding where sites occur on active floodplains and islands. Water tables are high in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. Fluctuating water tables increase the potential for oxidation/reduction processes, as indicated by mottled or gleyed soil characteristics. *Populus angustifolia* (narrowleaf cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although moisture may be present closer to the surface due to capillary action. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). Associated riparian shrub communities may be dominated by *Betula occidentalis* (water birch), *Salix exigua* (sandbar willow), *Crataegus douglasii* (Black hawthorn), and other willows. The *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occupy adjacent relatively undisturbed sites while the *Populus angustifolia*/Herbaceous (narrowleaf cottonwood/Herbaceous) community type may occur on severely disturbed sites. The *Populus angustifolia*/Recent Alluvial Bar (narrowleaf cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are often dominated by *Juniperus scopulorum* (Rocky Mountain juniper) woodlands, or more open, mixed sagebrush/grasslands dominated by *Artemisia tridentata* (big sagebrush).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense shrub understory within the stands. Forage production from dense thickets of *Symphoricarpos occidentalis* (western snowberry), when present, *Rhus aromatica* (fragrant sumac), *Elaeagnus commutata* (silverberry), and *Rosa woodsii* (woods rose) is low. Stands may be so dense that they exclude most livestock use. As the shrub understory is eliminated by continual prolonged heavy grazing or browsing, stands open and forage production increases accordingly with increased coverages of *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Bromus* species (brome) (Hansen and others 1995). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982), and the leaves of *Rosa woodsii* (woods rose) are considered fair to good livestock forage, particularly for sheep (Johnson and Nichols 1982). The forage value of *Rhus aromatica* (fragrant sumac) rates poorly for all forms of livestock. In some cases, stands may become so dense as to exclude most livestock. However, in arid regions where palatable species are scarce, this species may represent some of the only forage available and may be browsed heavily (Sampson and Jespersen 1963).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future gallery forest potential is lost.

Wildlife

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus angustifolia* (narrowleaf cottonwood) and *Rosa woodsii* (woods rose) are used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

The moderate structural understory diversity of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982). Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

Fisheries

The streamside location of this *Populus angustifolia/ Symphoricarpos occidentalis* (narrowleaf cottonwood/ western snowberry) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance cannot be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) are excellent in controlling erosion along streams due to their rhizomatous nature. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus angustifolia/Symphoricarpos occidentalis* (narrowleaf cottonwood/western snowberry) community type is susceptible to fire during the late summer and fall. *Populus angustifolia* (narrowleaf cottonwood) and other shrubs of this type are adapted to light and in some instances to moderate intensity fire and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Symphoricarpos occidentalis (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation. *Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel.

The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) makes it a good soil stabilizer (Hansen and others 1995). Sampson and Jespersen (1963) indicate that *Rhus aromatica* (fragrant sumac) is a sprouting species with a shallow and much branched rhizomatous root system. This not only makes it a good soil stabilizer and allows it to colonize large areas, but also permits it to actually increase overall coverage after a fire.

Soil Management and Rehabilitation Opportunities
Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well-drained soils, which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery-grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures within this type due to flood hazard.

Symphoricarpos occidentalis (western snowberry) is an important food source for upland birds due to fruits that persist into the winter. Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of the *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community type has been documented in Montana (Hansen and others 1995). A similar community type was described by Youngblood and others (1985b) for eastern Idaho and western Wyoming, and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Populus tremuloides/Cornus stolonifera Habitat Type (Quaking Aspen/Red-Osier Dogwood Habitat Type)

POPTRE/CORSTO (POTR10/COST4)
Number of Stands Sampled = 35

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type is a major type from moderately low to high elevations throughout the mountains and valleys of southcentral and eastern Idaho. Sites range in elevation from 1,455 to 2,200 m (4,800 to 7,260 ft). This habitat type typically occurs on alluvial terraces adjacent to streams and rivers in U- and V-shaped canyon drainages, or adjacent to hillside springs and seeps.

VEGETATION

Populus tremuloides/Cornus stolonifera (quaking aspen/red-osier dogwood) habitat type in southern and eastern Idaho may contain *Juniperus scopulorum* (Rocky Mountain juniper), *Pinus contorta* (lodgepole pine), *Pseudotsuga menziesii* (Douglas fir), or *Populus angustifolia* (narrowleaf cottonwood) in trace amounts scattered throughout an overstory dominated by *Populus tremuloides* (quaking aspen). Although this habitat type is generally characterized by a remarkably diverse understory at both the middle and lower layers, constancy and covers for many species tend to be low. *Cornus stolonifera* (red-osier dogwood) typically dominates the shrub understory with a variety of other less well represented species, such as willows, *Alnus incana* (mountain alder), *Rosa woodsii* (woods rose), and *Prunus virginiana* (common chokecherry). Graminoids include *Phleum pratense* (common timothy), *Glyceria striata* (fowl mannagrass), and *Poa pratensis* (Kentucky bluegrass), while forbs consist of species such as *Geum macrophyllum* (larged-leaved avens), *Smilacina stellata* (starry Solomon-plume), *Urtica dioica* (stinging nettle), or *Equisetum* species (horsetail) (Table 25).

Table 25. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type (number = 6 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	2	0-3	33
Populus tremuloides (quaking aspen)	50	30-60	100
Pseudotsuga menziesii (Douglas fir)	1	0-1	17
Shrubs			
Acer glabrum (Rocky Mountain maple)	40	0-40	17
Alnus incana (mountain alder)	16	0-30	33
Amelanchier alnifolia (western serviceberry)	1	0-1	17
Berberis repens (creeping Oregongrape)	30	0-30	17
Betula occidentalis (water birch)	20	0-20	17
Cornus stolonifera (red-osier dogwood)	56	0-80	83
Linnaea borealis (twinflower)	30	0-30	17
Lonicera involucrata (twin-berry)	10	0-10	17
Prunus virginiana (common chokecherry)	28	0-60	50
Rosa acicularis (prickly rose)	3	0-3	17
Rosa woodsii (woods rose)	3	0-3	50

Table 25 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Rubus idaeus (red raspberry)	1	0-1	17
Salix bebbiana (Bebb willow)	7	0-10	33
Salix boothii (Booth willow)	3	0-3	17
Salix lutea (yellow willow)	10	0-10	17
Shepherdia canadensis (Canada buffaloberry)	1	0-1	17
Solanum dulcamara (climbing nightshade)	10	0-10	17
Graminoids			
Agropyron dasystachyum (thick-spiked wheatgrass)	1	0-1	17
Agropyron repens (quackgrass)	3	0-3	17
Agrostis stolonifera (redtop)	3	0-3	17
Calamagrostis canadensis (bluejoint reedgrass)	20	0-20	17
Carex aurea (golden sedge)	1	0-1	17
Elymus glaucus (blue wildrye)	15	0-20	33
Glyceria grandis (American mannagrass)	1	0-1	17
Muhlenbergia asperifolia (alkali muhly)	30	0-30	17
Phalaris arundinacea (reed canarygrass)	3	0-3	17
Poa pratensis (Kentucky bluegrass)	2	0-3	33
Forbs			
Trisetum wolfii (Wolf's trisetum)	1	0-1	17
Achillea millefolium (common yarrow)	1	0-1	17
Actaea rubra (baneberry)	11	0-20	33
Aquilegia formosa (sitka columbine)	3	0-3	17
Aster eatonii (Eaton's aster)	1	0-1	17
Aster species (aster)	1	0-1	17
Bidens vulgata (tall beggar-ticks)	1	0-1	17
Cardamine species (bittercress)	3	0-3	17
Cirsium arvense (Canada thistle)	1	0-1	17
Cirsium vulgare (bull thistle)	1	0-1	17
Clintonia uniflora (queen's cup)	3	0-3	17
Cynoglossum officinale (common hound's-tongue)	3	0-3	17
Disporum trachycarpum (wartberry fairy-bell)	3	0-3	17
Dodecatheon jeffreyi (tall mountain shooting star)	1	0-1	17
Epilobium angustifolium (fireweed)	1	0-1	17
Forb	1	0-1	17
Fragaria virginiana (Virginia strawberry)	1	0-1	17
Galium aparine (goose-grass)	15	0-20	33
Galium boreale (northern bedstraw)	1	0-1	17
Galium trifidum (small bedstraw)	1	0-1	17
Galium triflorum (sweetscented bedstraw)	1	0-1	17
Geranium richardsonii (white geranium)	1	0-1	17
Geranium viscosissimum (sticky geranium)	3	0-3	17
Geum macrophyllum (larged-leaved avens)	6	0-10	33
Habenaria hyperborea (northern green bog-orchid)	1	0-1	17
Mentha arvensis (field mint)	10	0-10	17
Nepeta cataria (catnip)	3	0-3	17
Osmorhiza chilensis (mountain sweet-cicely)	10	0-10	17
Pyrola asarifolia (pink wintergreen)	1	0-1	17
Rudbeckia occidentalis (black head)	3	0-3	17
Scutellaria galericulata (marsh skullcap)	1	0-1	17
Senecio pseudaureus (streambank groundsel)	1	0-1	17
Senecio serra (tall butterweed)	3	0-3	17
Smilacina stellata (starry Solomon-plume)	6	0-20	67
Taraxacum officinale (common dandelion)	3	0-3	17
Thalictrum occidentale (western meadowrue)	1	0-1	17
Trifolium repens (white clover)	1	0-1	17
Urtica dioica (stinging nettle)	2	0-3	33
Valeriana species (valerian)	1	0-1	17
Verbascum thapsus (common mullein)	1	0-1	17
Viola species (violet)	1	0-1	17
Viola palustris (marsh violet)	1	0-1	17
Ferns and Allies			
Equisetum arvense (field horsetail)	20	0-20	17
Equisetum fluviatile (water horsetail)	30	0-30	17
Equisetum species (horsetail; scouring-rush)	10	0-10	17

SUCCESSIONAL INFORMATION

Various shrub communities, particularly *Alnus incana* (mountain alder), *Salix exigua* (sandbar willow), and *Salix lutea* (yellow willow), or deciduous forests, dominated by *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood), may act as transitional phases for the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type (Table 26). If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* species (spruce), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir). Excessive utilization of this habitat type by wildlife or livestock may affect the regeneration of both

Populus tremuloides (quaking aspen) and the shrub understory, shifting the site toward the disclimax *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type (Hansen and others 1995).

Table 26. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Populus tremuloides*/ *Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type (number = 29 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Acer negundo (box-elder)	1	0-1	3
Juniperus osteosperma (Utah juniper)	3	0-3	3
Juniperus scopulorum (Rocky Mountain juniper)	2	0-3	21
Picea species (spruce)	1	0-1	3
Pinus contorta (lodgepole pine)	3	0-3	3
Populus tremuloides (quaking aspen)	58	10-98	100
Populus trichocarpa (black cottonwood)	1	0-1	3
Pseudotsuga menziesii (Douglas fir)	1	0-1	10
Shrubs			
Acer glabrum (Rocky Mountain maple)	7	0-10	7
Alnus incana (mountain alder)	30	0-70	21
Alnus sinuata (Sitka alder)	40	0-40	3
Amelanchier alnifolia (western serviceberry)	2	0-3	10
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	3
Artemisia tridentata (big sagebrush)	1	0-1	3
Berberis repens (creeping Oregongrape)	2	0-3	17
Betula occidentalis (water birch)	20	0-30	10
Clematis columbiana (matted clematis)	1	0-1	3
Clematis ligusticifolia (western virgins-bower)	3	0-3	3
Clematis occidentalis (Columbia clematis)	1	0-1	3
Cornus stolonifera (red-osier dogwood)	23	0-60	55
Crataegus douglasii (black hawthorn)	18	0-40	14
Linnaea borealis (twinflower)	20	0-20	3
Lonicera involucrata (twin-berry)	3	0-3	3
Lonicera utahensis (Utah honeysuckle)	1	0-1	3
Potentilla fruticosa (shrubby cinquefoil)	2	0-3	10
Prunus virginiana (common chokecherry)	17	0-30	17
Rhus aromatica (fragrant sumac)	12	0-20	7
Ribes cereum (squaw currant)	2	0-3	7
Ribes species (currant; gooseberry)	6	0-20	31
Ribes hudsonianum (stinking currant)	7	0-10	17
Ribes lacustre (swamp currant)	3	0-3	3
Ribes odoratum (buffalo currant)	3	0-3	7
Ribes setosum (Missouri gooseberry)	20	0-20	3
Rosa acicularis (prickly rose)	11	0-60	38
Rosa species (rose)	20	0-20	3
Rosa woodsii (woods rose)	25	0-50	48
Rubus idaeus (red raspberry)	4	0-10	21
Rubus parviflorus (thimbleberry)	24	0-50	10
Salix bebbiana (Bebb willow)	7	0-20	38
Salix boothii (Booth willow)	7	0-20	31
Salix drummondiana (Drummond willow)	5	0-10	10
Salix exigua (sandbar willow)	7	0-10	7
Salix geyeriana (Geyer willow)	7	0-10	7
Salix lasiandra (Pacific willow)	20	0-20	3
Salix lutea (yellow willow)	13	0-20	14
Salix scouleriana (Scouler willow)	4	0-10	21
Sambucus racemosa (red elderberry)	1	0-1	3
Shepherdia canadensis (Canada buffaloberry)	6	0-10	7
Solanum dulcamara (climbing nightshade)	6	0-10	7
Spiraea betulifolia (shiny-leaf spiraea)	10	0-10	3
Symphoricarpos albus (common snowberry)	11	0-20	17
Symphoricarpos occidentalis (western snowberry)	22	0-40	21
Symphoricarpos oreophilus (mountain snowberry)	10	0-10	3
Symphoricarpos species (snowberry)	15	0-20	7
Toxicodendron rydbergii (poison ivy)	10	0-10	3
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	7
Agrostis exarata (spike bentgrass)	6	0-10	7
Agropyron repens (quackgrass)	16	0-70	17
Agrostis scabra (tickle-grass)	1	0-1	3
Agrostis stolonifera (redtop)	24	0-80	28
Alopecurus alpinus (alpine foxtail)	1	0-1	7
Bromus ciliatus (fringed brome)	5	0-20	21
Bromus commutatus (hairy brome)	3	0-3	3
Bromus inermis (smooth brome)	1	0-3	17
Bromus tectorum (cheatgrass)	1	0-1	3
Calamagrostis canadensis (bluejoint reedgrass)	17	0-30	21
Calamagrostis rubescens (pinegrass)	20	0-20	7
Calamagrostis stricta (narrow-spiked reedgrass)	4	0-10	17

Table 26 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Carex arcta (northern-clustered sedge)	1	0-1	3
Carex athrostachya (slender-beaked sedge)	3	0-3	3
Carex aurea (golden sedge)	1	0-1	3
Carex disperma (soft-leaved sedge)	5	0-10	10
Carex species (sedges)	1	0-1	3
Carex lanuginosa (woolly sedge)	1	0-1	7
Carex microptera (small-winged sedge)	1	0-1	10
Carex pachystachya (thick-headed sedge)	2	0-3	21
Carex rostrata (beaked sedge)	12	0-30	21
Dactylis glomerata (orchard-grass)	1	0-1	3
Eleocharis palustris (common spikesedge)	1	0-1	7
Elymus canadensis (Canada wildrye)	1	0-1	3
Elymus cinereus (basin wildrye)	1	0-1	3
Elymus glaucus (blue wildrye)	15	0-40	14
Glyceria grandis (American mannagrass)	20	0-20	3
Glyceria striata (fowl mannagrass)	10	0-30	28
Juncus balticus (Baltic rush)	2	0-3	10
Muhlenbergia asperifolia (alkali muhly)	21	0-40	7
Phalaris arundinacea (reed canarygrass)	27	0-70	10
Phleum pratense (common timothy)	12	0-60	38
Poa bulbosa (bulbous bluegrass)	1	0-1	3
Poa palustris (fowl bluegrass)	6	0-20	21
Poa pratensis (Kentucky bluegrass)	13	0-30	55
Forbs			
Achillea millefolium (common yarrow)	6	0-20	14
Aconitum columbianum (Columbian monkshood)	10	0-10	3
Actaea rubra (baneberry)	11	0-20	7
Allium brevistylum (short-style onion)	1	0-1	3
Angelica arguta (sharptooth angelica)	7	0-20	17
Anthemis cotula (dog fennel)	1	0-1	3
Antennaria species (everlasting; pussy-toes)	3	0-3	3
Aquilegia flavescens (yellow columbine)	12	0-20	7
Aquilegia formosa (sitka columbine)	1	0-1	3
Arctium minus (common burdock)	3	0-3	7
Arctium species (burdock)	1	0-1	3
Arenaria macrophylla (bigleaf sandwort)	2	0-3	7
Arnica cordifolia (heart-leaf arnica)	40	0-40	3
Arnica longifolia (longleaf arnica)	3	0-3	3
Aster chilensis (long-leaved aster)	20	0-20	3
Aster conspicuus (showy aster)	20	0-40	10
Aster species (aster)	1	0-1	3

Table 26 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Aster foliaceus (leafy aster)	40	0-40	3
Aster modestus (few-flowered aster)	6	0-10	24
Aster occidentalis (western aster)	5	0-20	45
Bidens vulgata (tall beggar-ticks)	1	0-1	3
Castilleja miniata (scarlet paintbrush)	3	0-3	3
Centaurea maculosa (spotted knapweed)	1	0-1	3
Cicuta maculata (spotted water-hemlock)	7	0-10	7
Cirsium arvense (Canada thistle)	7	0-20	28
Cirsium scariosum (elk thistle)	1	0-1	3
Cirsium vulgare (bull thistle)	2	0-3	14
Collinsia parviflora (small-flowered blue-eyed Mary)	10	0-10	3
Corallorhiza maculata (spotted coral-root)	3	0-3	3
Corallorhiza trifida (yellow coral-root)	1	0-1	3
Cynoglossum officinale (common hound's-tongue)	2	0-3	10
Delphinium species (larkspur)	1	0-1	3
Dodecatheon species (shooting star)	1	0-1	3
Epilobium angustifolium (fireweed)	6	0-20	21
Epilobium ciliatum (common willow-herb)	4	0-10	28
Epilobium latifolium (red willow-herb)	1	0-1	3
Forb	2	0-3	10
Fragaria virginiana (Virginia strawberry)	9	0-40	41
Galium aparine (goose-grass)	2	0-3	7
Galium bifolium (thinleaf bedstraw)	20	0-20	3
Galium boreale (northern bedstraw)	11	0-40	21
Galium trifidum (small bedstraw)	2	0-3	10
Galium triflorum (sweetscented bedstraw)	5	0-10	38
Gentianella amarella (northern gentian)	1	0-1	3
Geranium richardsonii (white geranium)	3	0-10	28
Geranium viscosissimum (sticky geranium)	6	0-10	14
Geum macrophyllum (larged-leaved avens)	2	0-3	41
Geum rivale (water avens)	2	0-3	7
Glycyrrhiza lepidota (American licorice)	10	0-10	3
Habenaria dilatata (white orchis)	1	0-1	3
Habenaria hyperborea (northern green bog-orchid)	1	0-1	3
Hackelia floribunda (showy stickseed)	1	0-1	3
Heracleum lanatum (cow-parsnip)	3	0-10	17

Table 26 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Hydrophyllum capitatum (ballhead waterleaf)	1	0-1	3
Iris missouriensis (Rocky Mountain iris)	3	0-3	7
Lactuca serriola (prickly lettuce)	2	0-3	7
Lithophragma parviflorum (smallflower woodlandstar)	1	0-1	3
Lupinus argenteus (silvery lupine)	1	0-1	3
Lysimachia ciliata (fringed loosestrife)	17	0-30	7
Melilotus alba (white sweet-clover)	3	0-3	3
Melilotus officinalis (yellow sweet-clover)	22	0-40	7
Mentha arvensis (field mint)	1	0-1	14
Mentha species (mint)	40	0-40	3
Mertensia ciliata (mountain bluebell)	2	0-3	10
Mertensia species (bluebell)	1	0-1	3
Mimulus guttatus (common monkey-flower)	2	0-3	10
Montia chamissoi (water montia)	1	0-1	3
Montia perfoliata (miner's lettuce)	3	0-3	3
Nemophila breviflora (Great Basin nemophila)	1	0-1	3
Nepeta cataria (catnip)	3	0-3	3
Osmorhiza chilensis (mountain sweet-cicely)	4	0-10	21
Osmorhiza depauperata (blunt-fruit sweet-cicely)	3	0-3	3
Osmorhiza occidentalis (western sweet-cicely)	7	0-10	7
Oxytropis sericea (silky crazyweed; white locoweed)	3	0-3	3
Petasites sagittatus (arrowleaf coltsfoot)	10	0-10	3
Phacelia heterophylla (varileaf phacelia)	1	0-1	3
Plantago major (common plantain)	1	0-1	7
Polygonum amphibium (water smartweed)	20	0-30	10
Polemonium occidentale (western polemonium)	1	0-1	3
Potentilla species (cinquefoil)	1	0-1	3
Potentilla gracilis (slender cinquefoil)	3	0-3	3
Pyrola asarifolia (pink wintergreen)	1	0-3	24
Pyrola secunda (one-sided wintergreen)	3	0-10	14
Ranunculus acris (tall buttercup)	3	0-3	3
Ranunculus hyperboreus (Arctic buttercup)	1	0-1	3
Ranunculus macounii (Macoun's buttercup)	1	0-1	3
Ranunculus uncinatus (little buttercup)	2	0-3	7

Table 26 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Rudbeckia hirta (black-eyed Susan)	10	0-10	3
Rudbeckia laciniata (tall coneflower)	10	0-10	3
Rumex crispus (curly dock)	2	0-3	10
Senecio canus (woolly groundsel)	3	0-3	3
Senecio species (groundsel; ragwort; butterweed)	1	0-1	3
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	3
Senecio pseudaureus (streambank groundsel)	6	0-20	14
Senecio serra (tall butterweed)	2	0-3	7
Senecio triangularis (arrowleaf groundsel)	1	0-1	3
Sium suave (hemlock water-parsnip)	1	0-1	3
Smilacina racemosa (false spikenard)	6	0-10	14
Smilacina stellata (starry Solomon-plume)	3	0-10	38
Solidago canadensis (Canada goldenrod)	13	0-40	14
Solidago gigantea (late goldenrod)	3	0-3	3
Solidago species (goldenrod)	3	0-3	3
Stachys palustris (swamp hedge-nettle)	10	0-10	3
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	7
Taraxacum officinale (common dandelion)	3	0-20	41
Thalictrum dasycarpum (purple meadowrue)	3	0-3	7
Thalictrum species (meadowrue)	1	0-1	3
Thalictrum occidentale (western meadowrue)	8	0-20	24
Thalictrum venulosum (veiny meadowrue)	1	0-1	3
Thlaspi arvense (field pennycress)	1	0-1	3
Tragopogon dubius (goat's beard)	1	0-1	7
Trifolium repens (white clover)	2	0-3	14
Urtica dioica (stinging nettle)	9	0-20	21
Veronica americana (American speedwell)	1	0-1	3
Verbascum thapsus (common mullein)	3	0-3	3
Vicia americana (American vetch)	3	0-3	7
Viola species (violet)	1	0-1	14
Ferns and Allies			
Equisetum arvense (field horsetail)	14	0-50	34
Equisetum hyemale (common scouring-rush)	1	0-1	3
Equisetum species (horsetail; scouring-rush)	1	0-1	3
Equisetum laevigatum (smooth scouring-rush)	2	0-3	7

SOILS

An organic layer, indicative of Mollisols, may be present to a depth of 25 cm (10 in) or more. Where sites occur below seeps and springs, this layer characteristically forms a saturated muck at the surface mixed with fine alluvial silts and sands. Where the organic layer is essentially absent, a sandy loam of similar dimensions may occur to depths over 60 cm (2 ft). Mottles may be in evidence, although infrequent, on sites that occupy active floodplains. Underlying horizons may be composed of fine and coarse sands. The deeper substrates are often dominated by gravels, cobbles, and rocks with fines filling the interstitial spaces. Litter and duff layers occur where flooding or disturbance is absent or infrequent and may be 45 cm (18 in) deep in extreme cases, but are generally only a few centimeters in depth. Water tables may be at or near the surface where sites occur below seeps and springs, or 2 m (6.5 ft) or more deep on upper floodplains, although moisture may be present closer to the surface due to capillary action.

ADJACENT COMMUNITIES

Cattails, bulrushes, *Eleocharis palustris* (common spikesedge), and *Phalaris arundinacea* (reed canarygrass) may occupy saturated sites adjacent to the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. Other associated riparian communities include *Alnus incana* (mountain alder), *Ribes* (currant and gooseberry), willows, *Rosa woodsii* (woods rose), and cottonwood. Drier uplands may be dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper), or by steppe vegetation such as *Artemisia tridentata* (big sagebrush) or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production varies from low to moderate, depending on the density of the tree and shrub layer. Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding grounds. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Timber

Populus tremuloides (quaking aspen) wood is used primarily for particleboard, especially wafer board and oriented strand board, and for pulp. The fibers are well suited for making fine paper. *Populus tremuloides* (quaking aspen) lumber is used for making boxes, crates, pallets, and furniture. Specialty products from the wood include excelsior, matchsticks, and tongue depressors (USDA Intermountain Fire Sciences Lab 2001). *Populus tremuloides* (quaking aspen) wood is light, soft, and straight grained. It has good dimensional stability and it turns, sands, and holds glue and paint well. It has relatively low strength, however, and is moderately low in shock resistance. Both sapwood and heartwood have low decay resistance and are difficult for preservatives to penetrate (USDA Intermountain Fire Sciences Lab 2001).

Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure (Hansen and others 1995).

Wildlife

Populus tremuloides (quaking aspen) groves provide important breeding, foraging, and resting habitat for a variety of birds and mammals. Wildlife utilization of *Populus tremuloides* (quaking aspen) communities varies with species composition of the understory and relative age of the stand. Young stands generally provide the most browse. *Populus tremuloides* (quaking aspen) crowns can grow out of reach of large ungulates in 6 to 8 years. Although many animals browse aspen year-round, it is especially valuable during fall and winter, when protein levels are high relative to other browse species (USDA Intermountain Fire Sciences Lab 2001).

Elk browse *Populus tremuloides* (quaking aspen) year-round, feeding on bark, branch apices, and sprouts. In some areas, elk use it mainly in winter (Kufeld 1973). *Populus tremuloides* (quaking aspen) is important forage for mule and white-tailed deer. Deer consume the leaves, buds, twigs, bark, and sprouts. New growth on burns or clearcuts is especially palatable to deer. Sprouts provide key summer forage for deer after herbaceous species have cured. Aspen is valuable moose browse for much of the year. Moose utilize it on summer and winter ranges. Young stands generally provide the best quality moose browse (Costain 1989).

Small rodents such as squirrels, pocket gophers, mice, and voles feed on *Populus tremuloides* (quaking aspen) during at least part of the year. Mice and voles frequently consume the bark below snow level, and can girdle suckers and small trees. Small mammal populations in *Populus tremuloides* (quaking aspen) stands generally fluctuate widely with stand age and annual variation in animal population size. Highest densities typically occur in mature stands (USDA Intermountain Fire Sciences Lab 2001).

Beaver consume the leaves, bark, twigs, and all diameters of *Populus tremuloides* (quaking aspen) branches. They use the stems for constructing dams and lodges. At least temporarily, beaver can eliminate *Populus tremuloides* (quaking aspen) from as far as 122 m (400 feet) from waterways. An individual beaver consumes 1-2 kg (2 to 4 pounds) of *Populus tremuloides* (quaking aspen) bark daily, and it is estimated that as many as 200 stems are required to support one beaver for a 1-year period (Allen 1983).

Populus tremuloides (quaking aspen) communities provide important feeding and nesting sites for a diverse array of birds. Bird species using aspen habitat include sandhill crane, western wood pewee, six species of ducks, blue, ruffed, and sharp-tailed grouse, band-tailed pigeon, mourning dove, wild turkey, red-breasted nuthatch, and pine siskin. *Populus tremuloides* (quaking aspen) is host to a variety of insects that are food for woodpeckers and sapsuckers. Generally, moist to mesic sites have greater avian species diversity than stands on dry sites (USDA Intermountain Fire Sciences Lab 2001).

Many bird species utilize *Populus tremuloides* (quaking aspen) communities of only a particular seral stage (Flack 1976). Research at a northern Utah site suggests that blue grouse, yellow-rumped warbler, warbling vireo, dark-eyed junco, house wren, and hermit thrush prefer mature stands. The MacGillivray's warbler, chipping and song sparrows, and lazuli bunting occur in younger stands. Bluebirds, tree swallow, pine siskin, yellow-bellied sapsucker, and black-headed grosbeak favor *Populus tremuloides* (quaking aspen) community edges (USDA Intermountain Fire Sciences Lab 2001).

Fisheries

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover. *Cornus stolonifera* (red-osier dogwood) is an excellent shrub for controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Hansen and others 1995). Brown (1984) provides information for using prescribed fire in *Populus tremuloides* (quaking aspen) stands. Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Populus tremuloides (quaking aspen) sprouts from the roots and establishes from off-site, wind-blown seed after fire. It is the classic soboliferous species: a plant that sprouts from carbohydrate-storing lateral roots (sobols). *Populus tremuloides* (quaking aspen) generally sprouts vigorously after fire. Long-term growth and survival of sprouts depend on a variety of factors including prefire carbohydrate levels in roots, sprouting ability of the clone(s), fire severity, and season of fire. Moderate-severity fire generally results in dense sprouting. Fewer sprouts may be produced after severe fire. Since *Populus tremuloides* (quaking aspen) is self-thinning, however, sprouting densities are generally similar several years after moderate and severe fire. A low-severity surface fire may leave standing live trees that locally suppress sprouting, resulting in an uneven-aged stand. *Populus tremuloides* (quaking aspen) burned in spring generally sprouts later in the growing season and again the following year. Fires in mid-growing season generally result in late-season sprouting. *Populus tremuloides* (quaking aspen) burned in late summer or fall usually sprouts the next spring (USDA Intermountain Fire Sciences Lab 2001).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Prescribed fire is recommended for *Populus tremuloides* (quaking aspen) stands. With the recent history of fire suppression there has been a general aging of *Populus tremuloides* (quaking aspen) stands across western North America. While conifers may replace seral stands, stable stands may become less productive. In many areas, *Populus tremuloides* (quaking aspen) stands now live longer than they did before fire exclusion, and many stands are in a state of decline due to advanced age (USDA Intermountain Fire Sciences Lab 2001).

Prescribed fire is often difficult to apply in *Populus tremuloides* (quaking aspen) stands because of the prominence of live fuels and often-sparse distribution of fine dead fuels. Even if fuels are plentiful, they are usually too moist to burn easily. Prescribed fire may be possible, however, when live vegetation cures enough to contribute to fire spread rather than hinder it. The optimum combination of dry weather and cured fuels occurs most often in early spring, late summer, and fall (USDA Intermountain Fire Sciences Lab 2001).

In most years, leaf fall and autumn precipitation coincide, making fall burning difficult. If September and October are dry, however, burning may be possible. Brown and Simmerman (1986) provide a method for appraising fuels and flammability in aspen to assist managers in choosing when to apply prescribed fire and helps determine proper conditions for burning.

Soil Management and Rehabilitation Opportunities
Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984).

Populus tremuloides (quaking aspen) may be useful in revegetating disturbed sites having moist, well-drained soils. Best results are obtained using rooted cuttings or nursery-grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils (Hansen and others 1995).

Where revegetation with woody shrub species is desired, *Cornus stolonifera* (red-osier dogwood), *Amelanchier alnifolia* (western serviceberry), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings are effective stabilizers of alluvial soil deposits (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Fishing and birding opportunities are often good. Campsites should be located away from stands of this type because of wet soils and large mosquito populations (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This habitat type has been described by Hansen and others (1995) for the state of Montana and Manning and Padgett (1992) for Nevada and eastern California.

Populus tremuloides/Herbaceous Community Type
(Quaking Aspen/Herbaceous Community Type)

POPTRE (POTR10)
Number of Stands Sampled = 25

CAUTION—Not all sites currently dominated by *Populus tremuloides* (quaking aspen) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type occurs at mid elevations throughout mountain valleys and foothills of eastern and southern Idaho. Sites range from 1,667 to 1,909 m (5,500 to 6,300 ft). This minor type occupies alluvial terraces adjacent to streams on both broad, level drainages and in steep-walled canyon bottoms. *Populus tremuloides* (quaking aspen) often establish small groves on hillsides near mountainous headwater springs and seeps.

VEGETATION

The *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type represents a grazing or browsing disclimax. *Populus tremuloides* (quaking aspen) dominates the overstory. Shrubs such as *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), *Prunus virginiana* (common chokecherry), and willows are absent or present in limited amounts only, due to high grazing and browsing pressures. *Rosa woodsii* (woods rose) may be present, often in substantial amounts. Grasses include *Poa pratensis* (Kentucky bluegrass) and *Phleum pratense* (common timothy). *Taraxacum officinale* (common dandelion) and *Fragaria virginiana* (Virginia strawberry) are common forbs (Table 27).

Table 27. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the grazing or browsing disclimax *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type (number = 25 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Populus tremuloides (quaking aspen)	53	10-80	100
Shrubs			
Rosa woodsii (woods rose)	13	0-40	72
Agropyron repens (quackgrass)	22	0-50	28
Juncus balticus (Baltic rush)	4	0-20	32

Table 27 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Graminoids			
Phleum pratense (common timothy)	19	0-60	44
Poa pratensis (Kentucky bluegrass)	32	0-70	72
Forbs			
Achillea millefolium (common yarrow)	1	0-3	40
Aster occidentalis (western aster)	3	0-10	44
Fragaria virginiana (Virginia strawberry)	7	0-20	36
Galium boreale (northern bedstraw)	2	0-3	32
Smilacina stellata (starry Solomon-plume)	2	0-10	40
Solidago canadensis (Canada goldenrod)	10	0-40	28
Taraxacum officinale (common dandelion)	8	0-30	60

SUCCESSIONAL INFORMATION

This community type reflects past periods of prolonged animal use. The *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type represents a grazing or browsing disclimax of the *Populus tremuloides* (quaking aspen) dominated habitat types. Loss of the original undergrowth dominants has occurred, and successful reproduction of *Populus tremuloides* (quaking aspen) has been severely limited. Conifers may have been present as potential late successional species but have been removed by prolonged grazing disturbance. Careful observation of site and vegetative characteristics may aid in determining the site's potential.

SOILS

Soils are commonly Entisols (Fluvents) or Mollisols (Borolls) derived from alluvium (Hansen and others 1995). Soil textures at the surface are classified as silt loams or silty clay loams. These upper horizons are nutrient rich with high organic matter contents, extending to the depths in excess of 75 cm (30 in) on more productive sites. Where this type frequents floodplains, sand, gravel, and cobble depositional layers may occur randomly throughout the soil solum, constituting 5-15 percent of the soil matrix. Channel bottoms, generally rock and cobble, characterize substrates at depth. Twig and leaf litter layers, 2-5 cm (1-2 in) deep, may cover the ground surface. Water tables are near the surface in the spring, but may drop below 1 m (36 in) by the end of the growing season.

ADJACENT COMMUNITIES

Adjacent wetter communities include *Carex nebrascensis* (Nebraska sedge) and *Phalaris arundinacea* (reed canary grass). Where disturbance is less severe, *Betula occidentalis* (water birch), willows, and *Prunus virginiana* (common chokecherry) may be in evidence locally in the riparian zone. As disturbance increases, *Rosa woodsii* (woods rose) and *Rhus aromatica* (fragrant sumac) will replace the less browse-tolerant species. Nearby uplands are often dominated by *Pseudotsuga menziesii* (Douglas fir) forests or *Populus tremuloides* (quaking aspen) groves. *Juniperus* (juniper)/mixed grass savannas and *Artemisia tridentata* (big sagebrush) shrublands may occupy plateaus above riverine canyons.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

This type is a valuable source of browse and forage for livestock and wildlife. Livestock use this type for shade and as bedding grounds. However, persistent grazing and trampling have resulted in compositional and structural changes, including the loss of native herbaceous species. Conversion back to the original vegetation is unlikely to occur simply by altering the grazing regime (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater. Streambanks associated with low vigor *Poa pratensis* (Kentucky bluegrass) are susceptible to sloughing (Hansen and others 1995).

Timber

Populus tremuloides (quaking aspen) wood is used primarily for particleboard, especially wafer board and oriented strand board, and for pulp. The fibers are well suited for making fine paper. *Populus tremuloides* (quaking aspen) lumber is used for making boxes, crates, pallets, and furniture. Specialty products from the wood include excelsior, matchsticks, and tongue depressors (USDA Intermountain Fire Sciences Lab 2001). *Populus tremuloides* (quaking aspen) wood is light, soft, and straight grained. It has good dimensional stability and it turns, sands, and holds glue and paint well. It has relatively low strength, however, and is moderately low in shock resistance. Both sapwood and heartwood have low decay resistance and are difficult for preservatives to penetrate (USDA Intermountain Fire Sciences Lab 2001).

Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure (Hansen and others 1995).

Wildlife

Populus tremuloides (quaking aspen) groves provide important breeding, foraging, and resting habitat for a variety of birds and mammals. Wildlife utilization of *Populus tremuloides* (quaking aspen) communities varies with species composition of the understory and relative age of the stand. Young stands generally provide the most browse. *Populus tremuloides* (quaking aspen) crowns can grow out of reach of large ungulates in 6 to 8 years. Although many animals browse aspen year-round, it is especially valuable during fall and winter, when protein levels are high relative to other browse species (USDA Intermountain Fire Sciences Lab 2001).

Elk browse *Populus tremuloides* (quaking aspen) year-round, feeding on bark, branch apices, and sprouts. In some areas, elk use it mainly in winter (Kufeld 1973). *Populus tremuloides* (quaking aspen) is important forage for mule and white-tailed deer. Deer consume the leaves, buds, twigs, bark, and sprouts. New growth on burns or clearcuts is especially palatable to deer. Sprouts provide key summer forage for deer after herbaceous species have cured. Aspen is valuable moose browse for much of the year. Moose utilize it on summer and winter ranges. Young stands generally provide the best quality moose browse (Costain 1989).

Small rodents such as squirrels, pocket gophers, mice, and voles feed on *Populus tremuloides* (quaking aspen) during at least part of the year. Mice and voles frequently consume the bark below snow level, and can girdle suckers and small trees. Small mammal populations in *Populus tremuloides* (quaking aspen) stands generally fluctuate widely with stand age and annual variation in animal population size. Highest densities typically occur in mature stands (USDA Intermountain Fire Sciences Lab 2001).

Beaver consume the leaves, bark, twigs, and all diameters of *Populus tremuloides* (quaking aspen) branches. They use the stems for constructing dams and lodges. At least temporarily, beaver can eliminate *Populus tremuloides* (quaking aspen) from as far as 122 m (400 feet) from waterways. An individual beaver consumes 1-2 kg (2 to 4 pounds) of *Populus tremuloides* (quaking aspen) bark daily, and it is estimated that as many as 200 stems are required to support one beaver for a 1-year period (Allen 1983).

Populus tremuloides (quaking aspen) communities provide important feeding and nesting sites for a diverse array of birds. Bird species using aspen habitat include sandhill crane, western wood pewee, six species of ducks, blue, ruffed, and sharp-tailed grouse, band-tailed pigeon, mourning dove, wild turkey, red-breasted nuthatch, and pine siskin. *Populus tremuloides* (quaking aspen) is host to a variety of insects that are food for woodpeckers and sapsuckers. Generally, moist to mesic sites have greater avian species diversity than stands on dry sites (USDA Intermountain Fire Sciences Lab 2001).

Many bird species utilize *Populus tremuloides* (quaking aspen) communities of only a particular seral stage (Flack 1976). Research at a northern Utah site suggests that blue grouse, yellow-rumped warbler, warbling vireo, dark-eyed junco, house wren, and hermit thrush prefer mature stands. The MacGillivray's warbler, chipping and song sparrows, and lazuli bunting occur in younger stands. Bluebirds, tree swallow, pine siskin, yellow-bellied sapsucker, and black-headed grosbeak favor *Populus tremuloides* (quaking aspen) community edges (USDA Intermountain Fire Sciences Lab 2001).

Understory species such as *Agropyron repens* (quackgrass), *Rosa* species (rose), and *Symphoricarpos* species (snowberry) provide food and cover for small mammals and birds, upland game and waterfowl (Dittberner and Olson 1983).

Fire

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Hansen and others 1995). Brown (1984) provides information for using prescribed fire in *Populus tremuloides* (quaking aspen) stands. Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Populus tremuloides (quaking aspen) sprouts from the roots and establishes from off-site, wind-blown seed after fire. It is the classic soboliferous species: a plant that sprouts from carbohydrate-storing lateral roots (sobols). *Populus tremuloides* (quaking aspen) generally sprouts vigorously after fire. Long-term growth and survival of sprouts depend on a variety of factors including prefire carbohydrate levels in roots, sprouting ability of the clone(s), fire severity, and season of fire. Moderate-severity fire generally results in dense sprouting. Fewer sprouts may be produced after severe fire. Since *Populus tremuloides* (quaking aspen) is self-thinning, however, sprouting densities are generally similar several years after moderate and severe fire. A low-severity surface fire may leave standing live trees that locally suppress sprouting, resulting in an uneven-aged stand. *Populus tremuloides* (quaking aspen) burned in spring generally sprouts later in the growing season and again the following year. Fires in mid-growing season generally result in late-season sprouting. *Populus tremuloides* (quaking aspen) burned in late summer or fall usually sprouts the next spring (USDA Intermountain Fire Sciences Lab 2001).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Prescribed fire is recommended for *Populus tremuloides* (quaking aspen) stands. With the recent history of fire suppression there has been a general aging of *Populus tremuloides* (quaking aspen) stands across western North America. While conifers may replace seral stands, stable stands may become less productive. In many areas, *Populus tremuloides* (quaking aspen) stands now live longer than they did before fire exclusion, and many stands are in a state of decline due to advanced age (USDA Intermountain Fire Sciences Lab 2001).

Prescribed fire is often difficult to apply in *Populus tremuloides* (quaking aspen) stands because of the prominence of live fuels and often-sparse distribution of fine dead fuels. Even if fuels are plentiful, they are usually too moist to burn easily. Prescribed fire may be possible, however, when live vegetation cures enough to contribute to fire spread rather than hinder it. The optimum combination of dry weather and cured fuels occurs most often in early spring, late summer, and fall (USDA Intermountain Fire Sciences Lab 2001).

In most years, leaf fall and autumn precipitation coincide, making fall burning difficult. If September and October are dry, however, burning may be possible. Brown and Simmerman (1986) provide a method for appraising fuels and flammability in aspen to assist managers in choosing when to apply prescribed fire and helps determine proper conditions for burning.

Populus tremuloides (quaking aspen) responds to fire by producing large numbers of vigorous root suckers. However, livestock and large ungulates should be kept out of newly burned stands if successful regeneration is desired. *Poa pratensis* (Kentucky bluegrass) is little harmed by fires, especially when moisture levels are adequate to dampen soil temperatures during the burn. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can severely damage stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities
Moist, fine textured soils are easily compacted and disturbed by livestock in spring and after rain events. Soil compaction is minimal on dry coarse textured soils.

Populus tremuloides (quaking aspen) may be useful in revegetating disturbed sites having moist, well-drained soils. Best results are obtained using rooted cuttings or nursery-grown stock. Once established, growth rates are rapid. The quickly spreading roots of *Populus tremuloides* (quaking aspen) effectively stabilize soils (Hansen and others 1995).

On the other hand, *Poa pratensis* (Kentucky bluegrass) is not very effective in stabilizing streambanks (Youngblood and others 1985b). Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
If stands are extensive, this community type may provide good campground locations. Overstory aspen provide shade in an often otherwise treeless environment. However, successful aspen reproduction is likely to be reduced or eliminated by trampling. Fencing of selected areas to allow suckers to grow is recommended.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented for the state of Montana (Hansen and others 1995). Similar grazing influenced *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community types have been described for southeastern Idaho and western Wyoming by Youngblood and Mueggler (1981), Mueggler and Campbell (1982), Chadde and others (1988), Mueggler (1988), and Padgett and others (1989).

Populus tremuloides/Osmorhiza occidentalis Habitat Type
(Quaking Aspen/Western Sweet-Cicely Habitat Type)

POPTRE/OSMOCC (POTR10/OSCC)
Number of Stands Sampled = 6

LOCATION AND ASSOCIATED LANDFORMS

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type is an incidental type occurring on broad, gentle mountain valleys and foothills of southcentral and eastern Idaho. *Populus tremuloides* (quaking aspen) stands may also occupy alluvial terraces adjacent to small streams in U-shaped canyons, or hillsides below springs and seeps. Sites range in elevation from 1,700 to 2,182 m (5,610 to 7,200 ft).

VEGETATION

Populus tremuloides (quaking aspen) essentially dominates the overstory of this habitat type. The modest shrub component may consist of *Symphoricarpos oreophilus* (mountain snowberry), *Amelanchier alnifolia* (western serviceberry), or *Rosa woodsii* (woods rose). The herbaceous layer is often dense and exhibits a high diversity of graminoids and forbs such as sedges, *Thalictrum occidentale* (western meadowrue), *Ranunculus* species (buttercup), *Osmorhiza occidentalis* (western sweet-cicely), and *Geranium viscosissimum* (sticky geranium) (Table 28). Moss may form a dense carpet over the ground surface below the herbaceous layer where sufficient moisture is present.

Table 28. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of disturbed and/or early to mid-seral stands of the *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type (number = 6 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus tremuloides (quaking aspen)	62	30-80	100
Shrubs			
Berberis repens (creeping Oregongrape)	6	0-10	33
Ribes setosum (Missouri gooseberry)	2	0-3	33
Rosa woodsii (woods rose)	16	0-40	67
Symphoricarpos oreophilus (mountain snowberry)	16	0-30	33
Graminoids			
Agrostis stolonifera (redtop)	10	0-20	50
Carex raynoldsii (Raynolds' sedge)	1	0-1	33
Elymus glaucus (blue wildrye)	12	0-20	33
Melica spectabilis (showy oniongrass)	1	0-1	33
Phleum pratense (common timothy)	17	0-30	33
Poa pratensis (Kentucky bluegrass)	2	0-3	67
Forbs			
Achillea millefolium (common yarrow)	8	0-20	67
Actaea rubra (baneberry)	2	0-3	50
Angelica arguta (sharptooth angelica)	2	0-3	33
Epilobium ciliatum (common willow-herb)	2	0-3	33
Erythronium grandiflorum (glacier-lily)	7	0-10	33
Fragaria virginiana (Virginia strawberry)	10	0-20	50
Galium boreale (northern bedstraw)	1	0-1	33
Geranium viscosissimum (sticky geranium)	8	0-10	67
Geum macrophyllum (larged-leaved avens)	2	0-3	33
Heracleum lanatum (cow-parsnip)	1	0-1	33
Lithophragma parviflorum (smallflower woodlandstar)	1	0-1	33
Mentha arvensis (field mint)	7	0-10	33
Nepeta cataria (catnip)	2	0-3	33
Osmorhiza occidentalis (western sweet-cicely)	7	0-10	50
Pedicularis bracteosa (bracted lousewort)	3	0-3	33
Perideridia bolanderi (Bolander's yampah)	11	0-20	33
Potentilla gracilis (slender cinquefoil)	7	0-10	33
Ranunculus species (buttercup)	15	0-20	33
Ranunculus uncinatus (little buttercup)	3	0-3	33
Rumex paucifolius (mountain sorrel)	6	0-10	33
Senecio foetidus (sweet-marsh butterweed)	10	0-10	33
Senecio serra (tall butterweed)	6	0-10	33
Smilacina stellata (starry Solomon-plume)	4	0-10	67
Taraxacum officinale (common dandelion)	1	0-1	67
Thalictrum occidentale (western meadowrue)	8	0-20	50
Urtica dioica (stinging nettle)	6	0-10	33
Wyethia helianthoides (white-head mule's-ears)	25	0-30	33

SUCCESSIONAL INFORMATION

Willow communities and cottonwood forests may act as seral stages for the *Populus tremuloides/Osmorhiza* *occidentalis* (quaking aspen/western sweet-cicely) habitat type. If site conditions shift to favor conifer types, *Populus tremuloides* (quaking aspen) stands may in turn act as seral stages for *Picea* species (spruce), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir). Although the *Populus tremuloides/ Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type exhibits varying degrees of impact from livestock use, prolonged, high intensity grazing may result in an increase in the proportion of disturbance tolerant species and a shift to the grazing or browsing disclimax *Populus tremuloides*/Herbaceous (quaking aspen/Herbaceous) community type (Hansen and others 1995).

SOILS

A litter/duff layer, predominantly *Populus tremuloides* (quaking aspen) leaves and twigs, reaches depths over 5 cm (2 in) on some locations. Fine textured soils, often rich in nutrients and organic materials, are present near the surface. Soils are probably classified as Mollisols or Entisols. The upper horizon, 60 cm (24 in) or more in depth, is predominantly silt or silt loam. Alluvial gravel and sand deposits may be present because of channel or overland flow, but are generally absent in the upper layers. Unconsolidated rocks, in the medium and large size class range, may comprise underlying layers, but generally, subsurface strata are dominated by loamy sand/sand and mixed gravels and cobbles. Water tables may be at or near the surface for some sites but reach depths of 1 m (39 in) or more on others.

ADJACENT COMMUNITIES

Other *Populus tremuloides* (quaking aspen)-dominated communities tend to occupy adjacent riparian zones. The *Populus tremuloides*/Herbaceous (quaking aspen/ Herbaceous) community type occurs on disturbed sites while the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type may establish on more inaccessible or undisturbed locations. Mixed willow communities often form complex thickets bordering streambanks and active floodplains, while *Wyethia* species (mule's-ears) create open meadows on moist hillsides in the northern regions of the study area near the Montana border. Adjacent drier upland sites are generally dominated by *Pinus contorta* (lodgepole pine), *Abies lasiocarpa* (subalpine fir), or *Pseudotsuga menziesii* (Douglas fir) forests, or *Artemisia tridentata* (big sagebrush) steppe. *Populus tremuloides* (quaking aspen) may also act as an upland species in montane zones where temperature and moisture regimes permit, appearing as closed, forested stands covering adjacent hillslopes.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Palatability of the various herbaceous species associated with this type are often high, and cattle use may be heavy as upland vegetation cures and animals spend much of their time in the shade provided by these communities. Livestock will use this type for forage, shade, and as bedding grounds. They also browse young suckers and, combined with trampling and soil compaction, can alter both the age structure and herbaceous layer of this type (Hansen and others 1995).

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type rates high for forage production. In a similar type in western Wyoming, Youngblood and Mueggler (1981) found forage production to be approximately 1,072 kg/ha (1,200 lbs/acre).

Timber

Populus tremuloides (quaking aspen) wood is used primarily for particleboard, especially wafer board and oriented strand board, and for pulp. The fibers are well suited for making fine paper. *Populus tremuloides* (quaking aspen) lumber is used for making boxes, crates, pallets, and furniture. Specialty products from the wood include excelsior, matchsticks, and tongue depressors (USDA Intermountain Fire Sciences Lab 2001). *Populus tremuloides* (quaking aspen) wood is light, soft, and straight grained. It has good dimensional stability and it turns, sands, and holds glue and paint well. It has relatively low strength, however, and is moderately low in shock resistance. Both sapwood and heartwood have low decay resistance and are difficult for preservatives to penetrate (USDA Intermountain Fire Sciences Lab 2001).

Overstory removal will result in sprouting of young aspen that are susceptible to grazing pressure (Hansen and others 1995).

Wildlife

The *Populus tremuloides/Osmorhiza occidentalis* (quaking aspen/western sweet-cicely) habitat type has high value as wildlife cover and feeding areas. *Populus tremuloides* (quaking aspen) groves provide important breeding, foraging, and resting habitat for a variety of birds and mammals. Wildlife utilization of *Populus tremuloides* (quaking aspen) communities varies with species composition of the understory and relative age of the stand. Young stands generally provide the most browse. *Populus tremuloides* (quaking aspen) crowns can grow out of reach of large ungulates in 6 to 8 years. Although many animals browse aspen year-round, it is especially valuable during fall and winter, when protein levels are high relative to other browse species (USDA Intermountain Fire Sciences Lab 2001).

Elk browse *Populus tremuloides* (quaking aspen) year-round, feeding on bark, branch apices, and sprouts. In some areas, elk use it mainly in winter (Kufeld 1973).

Populus tremuloides (quaking aspen) is important forage for mule and white-tailed deer. Deer consume the leaves, buds, twigs, bark, and sprouts. New growth on burns or clearcuts is especially palatable to deer. Sprouts provide key summer forage for deer after herbaceous species have cured. Aspen is valuable moose browse for much of the year. Moose utilize it on summer and winter ranges. Young stands generally provide the best quality moose browse (Costain 1989).

Small rodents such as squirrels, pocket gophers, mice, and voles feed on *Populus tremuloides* (quaking aspen) during at least part of the year. Mice and voles frequently consume the bark below snow level, and can girdle suckers and small trees. Small mammal populations in *Populus tremuloides* (quaking aspen) stands generally fluctuate widely with stand age and annual variation in animal population size. Highest densities typically occur in mature stands (USDA Intermountain Fire Sciences Lab 2001).

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Populus tremuloides (quaking aspen) communities provide important feeding and nesting sites for a diverse array of birds. Bird species using aspen habitat include sandhill crane, western wood pewee, six species of ducks, blue, ruffed, and sharp-tailed grouse, band-tailed pigeon, mourning dove, wild turkey, red-breasted nuthatch, and pine siskin. *Populus tremuloides* (quaking aspen) is host to a variety of insects that are food for woodpeckers and sapsuckers. Generally, moist to mesic sites have greater avian species diversity than stands on dry sites (USDA Intermountain Fire Sciences Lab 2001).

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Fisheries

Where adjacent to streams, stands of this type enhance fisheries by stabilizing banks and providing overhanging cover (Hansen and others 1995).

Fire

Wet conditions in the spring and summer tend to limit successful burning to the drier fall period. Fire, sometimes in combination with cutting, is becoming an increasingly important tool in regenerating decadent stands of *Populus tremuloides* (quaking aspen) (Hansen and others 1995). Brown (1984) provides information for using prescribed fire in *Populus tremuloides* (quaking aspen) stands. Protection of newly burned or cleared sites from beaver and grazing animals may be necessary for successful reproduction.

Populus tremuloides (quaking aspen) sprouts from the roots and establishes from off-site, wind-blown seed after fire. It is the classic soboliferous species: a plant that sprouts from carbohydrate-storing lateral roots (sobols). *Populus tremuloides* (quaking aspen) generally sprouts vigorously after fire. Long-term growth and survival of sprouts depend on a variety of factors including prefire carbohydrate levels in roots, sprouting ability of the clone(s), fire severity, and season of fire. Moderate-severity fire generally results in dense sprouting. Fewer sprouts may be produced after severe fire. Since *Populus tremuloides* (quaking aspen) is self-thinning, however, sprouting densities are generally similar several years after moderate and severe fire. A low-severity surface fire may leave standing live trees that locally suppress sprouting, resulting in an uneven-aged stand. *Populus tremuloides* (quaking aspen) burned in spring generally sprouts later in the growing season and again the following year. Fires in mid-growing season generally result in late-season sprouting. *Populus tremuloides* (quaking aspen) burned in late summer or fall usually sprouts the next spring (USDA Intermountain Fire Sciences Lab 2001).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Prescribed fire is recommended for *Populus tremuloides* (quaking aspen) stands. With the recent history of fire suppression there has been a general aging of *Populus tremuloides* (quaking aspen) stands across western North America. While conifers may replace seral stands, stable stands may become less productive. In many areas, *Populus tremuloides* (quaking aspen) stands now live longer than they did before fire exclusion, and many stands are in a state of decline due to advanced age (USDA Intermountain Fire Sciences Lab 2001).

Prescribed fire is often difficult to apply in *Populus tremuloides* (quaking aspen) stands because of the prominence of live fuels and often-sparse distribution of fine dead fuels. Even if fuels are plentiful, they are usually too moist to burn easily. Prescribed fire may be possible, however, when live vegetation cures enough to contribute to fire spread rather than hinder it. The optimum combination of dry weather and cured fuels occurs most often in early spring, late summer, and fall (USDA Intermountain Fire Sciences Lab 2001).

In most years, leaf fall and autumn precipitation coincide, making fall burning difficult. If September and October are dry, however, burning may be possible. Brown and Simmerman (1986) provide a method for appraising fuels and flammability in aspen to assist managers in choosing when to apply prescribed fire and helps determine proper conditions for burning.

Soil Management and Rehabilitation Opportunities
Soils compaction is likely when repeated animal use occurs on moist soils. Grazing should be deferred to periods when soils and streambanks are drier (Marlow 1984). *Populus tremuloides* (quaking aspen) can be useful in revegetating disturbed sites having moist, well-drained soils. Best results are obtained using rooted cuttings or nursery-grown stock. Once established, growth rates are rapid with spreading roots quickly stabilizing the soil Mueggler and Campbell (1982).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This habitat type represents the *Populus tremuloides-Populus trichocarpa/Osmorhiza occidentalis* (quaking aspen-black cottonwood/western sweet-cicely) community type described by Cooper (1981) for the Blackfeet Indian Reservation. A similar type was described by Lynch (1955) for Glacier County, Montana, and by Youngblood and Mueggler (1981) for western Wyoming. Hansen and others (1995) documented this habitat type for Montana

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Populus trichocarpa/Cornus stolonifera Community Type (Black Cottonwood/Red-Osier Dogwood Community Type)

POPTRI/CORSTO (POTR6/COST4)
Number of Stands Sampled = 27

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is a major type from low to higher elevations throughout the mountains, foothills, and valleys of southern and eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling minor stream courses, or as mosaics of smaller, clustered stands. This community type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range from 1,350 to 2,121 m (4,400 to 7,000 ft). Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. However, this trend has not been adequately established for sites in Idaho.

VEGETATION

Populus trichocarpa (black cottonwood) is the principal overstory species for this type. *Salix amygdaloides* (peach-leaf willow), *Populus angustifolia* (narrowleaf cottonwood) and *Populus acuminata* (lanceleaf cottonwood) may also be present as subordinates with minimal coverages. *Cornus stolonifera* (red-osier dogwood), the diagnostic shrub for this type, may form a dense understory with other shrub species such as *Betula occidentalis* (water birch), *Salix exigua* (sandbar willow), *Salix lutea* (yellow willow), and *Rosa woodsii* (woods rose). Grasses and forbs vary widely depending on the type and level of disturbance, and may be dense or sparse depending on the nature of the overlying shrub layer. The herbaceous element typically contains *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Phalaris arundinacea* (reed canarygrass), *Smilacina stellata* (starry Solomon-plume), and *Equisetum* species (horsetail) (Table 29). Deadwood may be prominent on the ground surface as mature stands become decadent with age.

Table 29. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of disturbed and/or early to mid-seral stands of the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type (number = 27 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	57	30-98	100
Shrubs			
Cornus stolonifera (red-osier dogwood)	38	3-90	100
Crataegus douglasii (black hawthorn)	8	0-30	26
Rosa woodsii (woods rose)	25	0-80	63
Symphoricarpos occidentalis (western snowberry)	24	0-40	26
Graminoids			
Agrostis stolonifera (redtop)	6	0-30	52
Poa pratensis (Kentucky bluegrass)	15	0-60	48
Forbs			
Cirsium arvense (Canada thistle)	7	0-20	26
Galium triflorum (sweetscented bedstraw)	5	0-10	26
Smilacina stellata (starry Solomon-plume)	6	0-20	44
Urtica dioica (stinging nettle)	3	0-10	26

SUCCESSIONAL INFORMATION

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type represents a mid-seral stage of primary succession (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/ Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type (Hansen and others 1995).

If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa/* Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers, ranging from clays and silt loams to fine sands, may extend to depths exceeding 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols or Entisols. Wood, rock and leaf litter are common components of the ground cover.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). Various shrub communities may form a mosaic pattern across the riparian zone, dominated by *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), and assorted willows. Other types in the *Populus trichocarpa* (Black cottonwood) series may border the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type where disturbance has altered the composition of the understory component and/or the physical site features. Drier adjacent riparian communities may include *Crataegus douglasii* (black hawthorn) and *Populus tremuloides* (quaking aspen). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper) shrublands, *Artemisia tridentata* (big sagebrush) steppe, and mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense nature of the stands. Stands in good to excellent health (condition) often support dense thickets of shrubs, limiting the amount of available forage. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife. Its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Most sites are presently subjected to heavy grazing pressures because of their topographic location and ease of access. With moderate to heavy prolonged grazing pressures, most shrubs will be eliminated leaving the shrubs *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) as the dominant understory. At this point, the stand has been converted to the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) disturbance-caused community type (Hansen and others 1995). If disturbance is severe, the shrubs will also be eliminated and the stand has converted to the *Populus trichocarpa/* Herbaceous (black cottonwood/Herbaceous) disturbance-caused community type (Hansen and others 1995).

Timber

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

Wildlife

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. The spreading crown of *Populus trichocarpa* (black cottonwood) provides sites for huge platform like stick nests of bald eagles and ospreys (Arno and Hammerly 1984) and for great blue herons (Parker 1980). Canada geese occasionally use the nests previously built by bald eagles and osprey. A variety of birds and mammals, such as woodpeckers, great horned owls, wood ducks, and raccoons, nest in trunk cavities. *Populus trichocarpa* (black cottonwood) and *Cornus stolonifera* (red-osier dogwood) are often eaten by moose (Costain 1989) and used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The streamside location of the *Populus trichocarpa/ Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is very important in providing thermal cover, debris recruitment, and streambank stability. Its importance cannot be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Cornus stolonifera* (red-osier dogwood) and associated shrub species are excellent in controlling erosion along streams. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire

The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type is susceptible to fire during the late summer and fall. *Populus trichocarpa* (black cottonwood) and associated shrubs are adapted to light and in some instances to moderate intensity fire and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of willows and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), Montana (Hansen and others 1995), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982).

Populus trichocarpa/Herbaceous Community Type (Black Cottonwood/Herbaceous Community Type)

POPTRI (POTR6)
Number of Stands Sampled = 12

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa*/Herbaceous (black cottonwood/ Herbaceous) community type is a minor type from low to moderately high elevations throughout the mountains, foothills, and valleys of southcentral and eastern Idaho. *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, establishing extensive forests, narrow, stringer communities paralleling minor stream courses, or matrices of smaller clustered stands. This community type may be located on stream banks and alluvial bars immediately adjacent to flowing channels or stranded on upper, secondary floodplains as natural river dynamics cause channels to migrate across valley bottoms. Sites range from 1,350 to 2,121 m (4,400 to 7,000 ft). Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in

Montana. However, this trend has not been adequately established for sites in Idaho.

VEGETATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type in Idaho forms essentially a two-tiered structure, dominated by *Populus trichocarpa* (black cottonwood) in the overstory, and *Poa pratensis* (Kentucky bluegrass) and other disturbance induced species in the understory. This type is a grazing or browsing disclimax, the result of prolonged, intense utilization by livestock and, to a lesser degree, wildlife. *Populus trichocarpa* (black cottonwood) may form a dense, closed canopy, or a more open overstory of widely scattered individuals, often with limited coverages of *Populus angustifolia* (narrowleaf cottonwood). The shrub component is essentially absent, or when present, only as a remnant, represented by disturbance tolerant species such as *Rosa woodsii* (woods rose) and *Crataegus douglasii* (black hawthorn). *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), aster, and *Cirsium arvense* (Canada thistle) are common herbaceous species (Table 30).

Table 30. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type (number = 12 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	48	30-80	100
Shrubs			
Rosa woodsii (woods rose)	2	0-3	58
Graminoids			
Agropyron repens (quackgrass)	23	0-70	33
Bromus inermis (smooth brome)	24	0-60	25
Hordeum jubatum (foxtail barley)	5	0-10	25
Phleum pratense (common timothy)	16	0-60	42
Poa palustris (fowl bluegrass)	11	0-20	25
Poa pratensis (Kentucky bluegrass)	23	0-80	67
Forbs			
Aster occidentalis (western aster)	1	0-1	25
Centaurea maculosa (spotted knapweed)	6	0-20	33
Glycyrrhiza lepidota (American licorice)	2	0-3	25
Monarda fistulosa (horsemint)	1	0-1	25
Smilacina stellata (starry Solomon-plume)	1	0-1	25
Tanacetum vulgare (common tansy)	11	0-30	33
Taraxacum officinale (common dandelion)	4	0-10	25
Urtica dioica (stinging nettle)	1	0-1	25
Viola species (violet)	2	0-3	25
Ferns and Allies			
Equisetum hyemale (common scouring-rush)	1	0-1	25

SUCCESSIONAL INFORMATION

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type represents a severely disturbed secondary successional stage of the mid-seral *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type (Hansen and others 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper).

Secondary Successional Stages
The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This stage is called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Symphoricarpos occidentalis* (western snowberry) and *Rosa* species (rose), which can form a nearly impenetrable understory. This stage of disturbance-caused succession is called the *Populus trichocarpa/ Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type (Hansen and others 1995).

If the disturbance is severe enough, ***ALL*** shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus inermis* (smooth brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers, ranging from clay or silt loams to fine sands, may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols or Entisols. Wood, rock and leaf litter are common components of the ground cover.

ADJACENT COMMUNITIES

Cattail, bulrush, *Phalaris arundinacea* (reed canarygrass), and assorted willows often occupy saturated sites. Other types in the *Populus trichocarpa* (black cottonwood) group may border the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type, depending on the level and type of disturbance on the site. Drier adjacent riparian communities may include *Crataegus douglasii* (black hawthorn) or *Populus tremuloides* (quaking aspen). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper) shrublands, or *Artemisia tridentata* (big sagebrush)/or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type provides moderate levels of spring and summer forage. Heavy grazing and trampling tend to maintain the open (park-like) structure of this community type and continued dominance of the undergrowth by *Poa pratensis* (Kentucky bluegrass) *Phleum pratense* (common timothy), *Bromus* species (brome), and a variety of “weedy” forbs. This community type has been and in many instances, still is used by the ranching community as a winter feeding ground. *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), and *Bromus* species (brome) are palatable and moderately productive, especially when soil moisture levels are high, and tolerate a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Timber

Due to the favorable moisture relationship of this type, timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a graminoid-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites are prone to at least occasional alluvial deposition through flooding, new seedbeds will not develop and the timber potential will be lost.

Wildlife

This type is a source of early spring forage for moose, deer, and elk. Cover value is limited because of the typically open, two layered structure. Many species of birds are common since food and cover is available both on the ground and in the trees. Great blue herons nest in large cottonwood stands if isolation during the nesting period is possible. Colonial nest sites are used for many years if left undisturbed (Parker 1980). Osprey will also use this type for nesting (Zarn 1974).

Fisheries

The streamside location of this type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance cannot be emphasized enough (Hansen and others 1995).

Fire

This type will burn when conditions are dry, such as fall or in late winter if snow accumulations are minimal. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and

Smeins 1967). Intense burns during active growing periods can used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities
Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) *MAY* allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been reported for western Montana (Foote 1965), Montana (Hansen and others 1995), central Oregon (Kovalchik 1987), and central Idaho (Tuhy and Jensen 1982)

Populus trichocarpa/Recent Alluvial Bar Community Type (Black Cottonwood/Recent Alluvial Bar Community Type)

POPTRI (POTR6)
Number of Stands Sampled = 17

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an incidental type from low to moderately high elevations throughout the valleys, foothills, and mountains of southcentral and eastern Idaho. Sites range from 1,350 to 2,121 m (4,400 to 7,000 ft). *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling stream courses, or as matrices of smaller, clustered stands. Seedlings germinate on point bars, side bars, mid channel bars, delta bars and outwash plains, requiring unvegetated, barren sites composed of sands, cobbles, and/or gravels, and water levels at or near the surface. Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. However, this trend has not been adequately established for sites in Idaho.

VEGETATION

This type is characterized by a stand dominated by seedlings or saplings of *Populus trichocarpa* (black cottonwood), or a stand codominated by cottonwoods and assorted willows. *Populus angustifolia* (narrowleaf cottonwood) may be present but is subordinate to *Populus trichocarpa* (black cottonwood). Various sedges are present, as are miscellaneous forbs. *Agrostis stolonifera* (redtop) may also be prominent in some locations (Table 31).

Table 31. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type that are relatively undisturbed by livestock or wildlife (number = 9 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	22
Pinus ponderosa (ponderosa pine)	2	0-3	22
Populus trichocarpa (black cottonwood)	50	10-98	100
Shrubs			
Alnus incana (mountain alder)	20	0-20	11
Amelanchier alnifolia (western serviceberry)	1	0-1	22
Betula occidentalis (water birch)	3	0-3	11
Clematis ligusticifolia (western virgins-bower)	1	0-1	11
Cornus canadensis (bunchberry)	40	0-40	11
Cornus stolonifera (red-osier dogwood)	2	0-3	22
Prunus virginiana (common chokecherry)	1	0-1	11
Rosa woodsii (woods rose)	2	0-3	22
Salix drummondiana (Drummond willow)	1	0-1	11
Salix exigua (sandbar willow)	11	0-20	44
Salix lutea (yellow willow)	1	0-1	11
Salix scouleriana (Scouler willow)	3	0-3	11
Symphoricarpos occidentalis (western snowberry)	1	0-1	22
Toxicodendron rydbergii (poison ivy)	1	0-1	22
Graminoids			
Agropyron repens (quackgrass)	1	0-1	33
Agropyron smithii (western wheatgrass)	1	0-1	11
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	11
Agrostis stolonifera (redtop)	7	0-10	33
Calamagrostis canadensis (bluejoint reedgrass)	21	0-40	22
Carex prionophylla (saw-leaved sedge)	3	0-3	11
Dichanthelium acuminatum (western witchgrass)	2	0-3	22
Elymus glaucus (blue wildrye)	1	0-1	11
Phleum pratense (common timothy)	2	0-3	22
Poa compressa (Canada bluegrass)	6	0-10	44
Poa palustris (fowl bluegrass)	20	0-20	11
Poa pratensis (Kentucky bluegrass)	1	0-1	11
Forbs			
Allium cernuum (Nodding onion)	1	0-1	11
Allium schoenoprasum (chives)	1	0-1	11
Arnica lonchophylla (pointed-leaf arnica)	1	0-1	11
Artemisia lindleyana (riverbank wormwood)	1	0-1	22
Asclepias speciosa (showy milkweed)	1	0-1	11
Aster foliaceus (leafy aster)	3	0-3	11
Aster laevis (smooth aster)	1	0-1	11
Aster modestus (few-flowered aster)	3	0-3	11
Astragalus species (milk-vetch; orophaca)	1	0-1	11
Centaurea maculosa (spotted knapweed)	1	0-1	11

Table 31 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Chenopodium species (goosefoot)	1	0-1	11
Epilobium angustifolium (fireweed)	3	0-3	11
Euphorbia esula (leafy spurge)	1	0-1	22
Fragaria vesca (woods strawberry)	3	0-3	11
Gaillardia aristata (blanket-flower)	1	0-1	11
Galium triflorum (sweetscented bedstraw)	1	0-1	11
Heracleum lanatum (cow-parsnip)	20	0-20	11
Hypericum perforatum (common St. John's-wort)	1	0-1	11
Lathyrus ochroleucus (cream-flowered peavine)	1	0-1	11
Lysimachia ciliata (fringed loosestrife)	10	0-10	11
Medicago lupulina (black medic)	1	0-1	11
Medicago sativa (alfalfa)	10	0-10	11
Melilotus alba (white sweet-clover)	1	0-1	22
Melilotus officinalis (yellow sweet-clover)	1	0-1	11
Oxytropis species (crazyweed; locoweed)	1	0-1	11
Physostegia parviflora (purple dragonhead)	1	0-1	11
Smilacina stellata (starry Solomon-plume)	3	0-3	33
Solidago canadensis (Canada goldenrod)	2	0-3	22
Streptopus amplexifolius (clasping-leaved twisted-stalk)	3	0-3	11
Tanacetum vulgare (common tansy)	1	0-1	22
Taraxacum officinale (common dandelion)	1	0-1	33
Thalictrum occidentale (western meadowrue)	40	0-40	11
Vicia americana (American vetch)	1	0-1	22
Viola species (violet)	1	0-1	11
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	11
Equisetum hyemale (common scouring-rush)	1	0-1	11
Equisetum laevigatum (smooth scouring-rush)	1	0-1	11

SUCCESSIONAL INFORMATION

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type represents an early seral (pioneer) stage of primary succession (Hansen and other 1995).

Primary Successional Stages

Cottonwoods are a pioneering species that require moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage.

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/ Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, the conifers are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, at low to mid elevations succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to wetland habitat types dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Picea* (spruce), *Abies lasiocarpa* (subalpine fir), and *Juniperus scopulorum* (Rocky Mountain juniper). In other instances, this community type may be successional to the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, depending upon elevation.

Secondary Successional Stages

The normal primary successional sequence (described above) may be altered due to varying degrees of grazing and browsing pressures. Moderate, prolonged grazing and browsing pressures will cause a stand to progress to the disturbance-caused *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type. Severe, prolonged grazing and browsing pressures may eliminate all conifer and/or deciduous seedlings and may eliminate the undergrowth of shrub species as well. This severely disturbed stage of secondary succession is called the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type. In this situation, the overstory of *Populus trichocarpa* (black cottonwood) still matures and becomes open with an understory dominated by herbaceous species. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types (Hansen and others 1995).

Stands of the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type are very susceptible to the natural dynamics of a river system and may be flooded and eliminated after just a year or two of growth. Ice can also have a dramatic impact on these recently deposited alluvial bars. Ice can influence the floodplain landscape by either one of two ways: 1) mechanical damage, or 2) flooding (inundation). Mechanical damage generally involves the following: a) the laying down or bending over of the younger cottonwoods, b) the physical shearing off of the stems, c) the actual pulling out of the ground by the ice that surrounds the main stems, and d) the tilting or pushing over of mature trees. Young cottonwood seedlings and saplings are very susceptible to defoliation by livestock. If livestock pressures are too great, the stand can be either partially or totally eliminated. In many situations, excessive livestock pressure has eliminated the establishment of new cottonwood stands. Beaver and big game species can also have a dramatic impact on newly established cottonwood stands.

Table 32. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type (number = 7 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	41	10-80	100
Pseudotsuga menziesii (Douglas fir)	1	0-1	14
Shrubs			
Alnus sinuata (Sitka alder)	1	0-1	29
Clematis ligusticifolia (western virgins-bower)	1	0-1	14
Cornus stolonifera (red-osier dogwood)	7	0-10	29
Crataegus douglasii (black hawthorn)	3	0-3	14
Juniperus communis (common juniper)	1	0-1	14
Potentilla fruticosa (shrubby cinquefoil)	3	0-3	14
Ribes species (currant; gooseberry)	1	0-1	14
Rosa species (rose)	1	0-1	14
Rosa gymnocarpa (baldhip rose)	1	0-1	14
Salix bebbiana (Bebb willow)	20	0-20	14
Salix boothii (Booth willow)	7	0-10	29
Salix drummondiana (Drummond willow)	30	0-40	29
Salix exigua (sandbar willow)	14	0-30	57
Salix lasiandra (Pacific willow)	1	0-1	14
Salix lutea (yellow willow)	3	0-3	29
Sambucus cerulea (blue elderberry)	1	0-1	14
Shepherdia canadensis (Canada buffaloberry)	1	0-1	14
Symphoricarpos occidentalis (western snowberry)	1	0-1	14
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	14
Agropyron repens (quackgrass)	11	0-20	43
Agrostis stolonifera (redtop)	24	0-60	43
Bromus ciliatus (fringed brome)	1	0-1	14

Table 32 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Bromus inermis (smooth brome)	10	0-10	14
Carex species (sedges)	1	0-1	14
Dactylis glomerata (orchard-grass)	11	0-20	29
Elymus glaucus (blue wildrye)	1	0-1	14
Phleum pratense (common timothy)	11	0-30	43
Poa compressa (Canada bluegrass)	37	0-70	43
Poa palustris (fowl bluegrass)	11	0-20	29
Poa pratensis (Kentucky bluegrass)	11	0-20	29
Forbs			
Achillea millefolium (common yarrow)	1	0-1	14
Actaea rubra (baneberry)	3	0-3	14
Amaranthus species (amaranth; pigweed)	1	0-1	14
Apocynum cannabinum (hemp dogbane)	3	0-3	14
Arctium minus (common burdock)	16	0-30	29
Arnica chamissonis (meadow arnica)	1	0-1	14
Artemisia longifolia (long-leaved sagewort)	1	0-1	14
Artemisia ludoviciana (prairie sagewort)	2	0-3	29
Aster occidentalis (western aster)	1	0-1	14
Centaurea maculosa (spotted knapweed)	7	0-20	43
Chenopodium album (lambsquarter)	10	0-10	14
Chrysanthemum leucanthemum (oxeye-daisy)	1	0-1	29
Cirsium arvense (Canada thistle)	11	0-20	29
Cirsium vulgare (bull thistle)	1	0-1	14
Coreopsis tinctoria (plains coreopsis)	1	0-1	14
Epilobium angustifolium (fireweed)	3	0-3	14
Epilobium palustre (swamp willow-herb)	1	0-1	14
Fragaria virginiana (Virginia strawberry)	3	0-3	14
Galium palustre (marsh bedstraw)	1	0-1	14
Geranium richardsonii (white geranium)	10	0-10	14
Geranium viscosissimum (sticky geranium)	3	0-3	14
Heracleum lanatum (cow-parsnip)	1	0-1	14
Leonurus cardiaca (motherwort)	10	0-10	14
Medicago lupulina (black medic)	1	0-1	29
Melilotus alba (white sweet-clover)	2	0-3	29
Melilotus officinalis (yellow sweet-clover)	20	0-20	14
Mentha arvensis (field mint)	1	0-1	14
Mimulus moschatus (musk-flower)	1	0-1	14
Nepeta cataria (catnip)	1	0-1	14
Osmorhiza chilensis (mountain sweet-cicely)	1	0-1	14
Picradeniopsis oppositifolia (plains bahia)	1	0-1	14

Table 32 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Potentilla palustris (purple cinquefoil)	3	0-3	14
Prunella vulgaris (self-heal)	1	0-1	14
Sanicula marilandica (black snake-root)	3	0-3	14
Senecio pseudaureus (streambank groundsel)	6	0-10	29
Solidago canadensis (Canada goldenrod)	3	0-3	14
Solidago species (goldenrod)	6	0-10	29
Sonchus asper (prickly sowthistle)	1	0-1	29
Tanacetum vulgare (common tansy)	11	0-30	43
Taraxacum officinale (common dandelion)	7	0-20	43
Thelypodium species (thelypody)	1	0-1	14
Tragopogon dubius (goat's beard)	11	0-20	29
Trifolium species (clover)	20	0-20	14
Valeriana occidentalis (western valerian)	1	0-1	14
Vicia americana (American vetch)	1	0-1	14
Viola canadensis (Canada violet)	1	0-1	14
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	1	0-1	14
Equisetum pratense (meadow horsetail)	1	0-1	14

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers, ranging from clay or silt loams to fine sands, may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols or Entisols.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). Various shrub communities may form a mosaic pattern across the riparian zone, dominated by *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), and assorted willows. The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type often occupies adjacent relatively undisturbed sites while the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type occurs frequently on severely disturbed locations. Drier adjacent riparian communities may be dominated by *Crataegus douglasii* (black hawthorn) or *Populus tremuloides* (quaking aspen). Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) shrublands and/or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is low to moderate. Stands in good to excellent health (condition) often support dense thickets of cottonwoods and associated shrub species thereby limiting the amount of available forage. These stands are very susceptible to defoliation by livestock. If establishment of new cottonwood stands is a management objective, livestock impacts should be closely monitored. In some situations, it may be advisable to eliminate livestock use until the cottonwoods are of sufficient height to preclude defoliation by livestock (Hansen and others 1995).

Wildlife

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type provides valuable cover, shade, and food for a variety of species. Big game use may be high, depending upon the time of year. *Populus trichocarpa* (black cottonwood) is used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

Fisheries

The streamside location of the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is valuable for fisheries by providing streambank stability (Hansen and others 1995).

Fire

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is susceptible to fire. In general, cottonwood seedlings, and to a lesser degree, cottonwood saplings do not have an extensive root system or thick bark and may be severely damaged (or eliminated) by fire (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The coarse textured substrates are not susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. Managers should maintain a buffer strip of the *Populus trichocarpa* (black cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize stream banks, and slow flood waters (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species. However, the dense nature of many of these stands may preclude various types of recreational activities such as fly fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type has been described by Hansen and others (1995) for the state of Montana.

Populus trichocarpa/Symphoricarpos occidentalis Community Type (Black Cottonwood/Western Snowberry Community Type)

POPTRI/SYMOCC (POTR6/SYOC)
Number of Stands Sampled = 21

LOCATION AND ASSOCIATED LANDFORMS

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is a minor type at low to mid elevations in mountains, foothills, and valleys of southern and eastern Idaho, ranging from 1,350 to 2,121 m (4,400 to 7,000 ft). *Populus trichocarpa* (black cottonwood) stands occupy floodplains and islands of major streams and rivers, developing as extensive forests, as narrow, stringer communities paralleling minor stream courses, or as mosaics of smaller, clustered stands. While stands often occur on point bars, side bars, mid channel bars, and delta bars, they may be located well away from the river on drier secondary floodplains as a result of channel migration over time. Hansen and others (1995) indicate that *Populus trichocarpa* (black cottonwood) generally occurs at higher elevations than *Populus angustifolia* (narrowleaf cottonwood) in Montana. However, this trend has not been adequately established for sites in Idaho.

VEGETATION

The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is a grazing disclimax. *Populus trichocarpa* (black cottonwood) dominates the overstory, with the occasional presence of *Juniperus scopulorum* (Rocky Mountain juniper) and *Populus angustifolia* (narrowleaf cottonwood). The shrub component consists of *Rosa woodsii* (woods rose), *Symphoricarpos occidentalis* (western snowberry), *Crataegus douglasii* (black hawthorn), *Clematis ligusticifolia* (western virgins-bower), and other disturbance tolerant shrubs. The herbaceous understory generally consists of disturbance-induced species as well, notably *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), and *Smilacina stellata* (starry Solomon-plume) (Table 33). Although *Symphoricarpos occidentalis* (western snowberry) is the diagnostic species for this type, it does not maintain 100 percent constancy and is not present in all locations.

Table 33. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Populus trichocarpa/ Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type (number = 21 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	65	20-90	100
Shrubs			
Amelanchier alnifolia (western serviceberry)	13	0-60	33
Prunus virginiana (common chokecherry)	5	0-10	29
Rosa woodsii (woods rose)	22	0-60	71
Symphoricarpos occidentalis (western snowberry)	13	0-30	43
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	33
Agrostis stolonifera (redtop)	24	0-60	29
Phleum pratense (common timothy)	23	0-80	38
Poa pratensis (Kentucky bluegrass)	17	0-50	67
Forbs			
Achillea millefolium (common yarrow)	2	0-3	29
Smilacina stellata (starry Solomon-plume)	5	0-20	62
Taraxacum officinale (common dandelion)	2	0-3	38

SUCCESSIONAL INFORMATION

Hansen and others (1995) state that the *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type represents a moderately disturbed secondary successional stage of the mid-seral *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type.

Primary Successional Stages

Cottonwoods are a pioneering species that requires moist, barren, newly deposited alluvium that is exposed to full sunlight. In general, these sites represent point bars, sidebars, mid channel bars, delta bars, and islands. Since cottonwoods do not regenerate in their own shade and require moist, barren, fully exposed, newly deposited alluvial material as a suitable seedbed, they are considered a seral species and do not represent the climax community (PNC) for the site. Many stands may appear to have limited regeneration, especially in the open areas. However, it is important to understand that these young seedlings and saplings represent sprouts (asexual reproduction) and not establishment by seeds (sexual reproduction). These sprouts may help prolong the life span of the stand, but will not perpetuate or maintain the stand. In time, the cottonwood stand will be replaced by a later successional stage (Hansen and others 1995).

The erosional and depositional pattern of a river helps maintain the diversity of plant communities on the floodplain. The distribution of various communities depends on the way the river meanders. In turn, the rate of meandering determines the proportion of floodplain communities considered to be in the pioneer or early seral, mid-seral, late seral, or climax (PNC) stage of succession. Where the river meanders frequently, few stands progress to later successional stages. Near the outer edges of the floodplain, the effect of the river is less pronounced, allowing later successional stages to develop. Typically, rivers meander like a whip or snake across their floodplain. Lateral movement of the river initiates a dynamic series of vegetation events. As water moves downstream, it erodes established banks, typically covered with riparian or wetland vegetation in different stages of development, on outside curves and deposits fresh alluvial materials on the point bars of inside curves. Each new deposit of alluvium forms a distinct band or terrace with each band being even aged and with gaps in ages between the bands. The ages of the bands are progressively older on older terraces. As the river moves away from sites of previous deposition and continues to downcut, the amount of soil water recharge from channel seepages decreases, making these sites (terraces) drier. If certain portions of the floodplain remain undisturbed for a long enough period of time, their relief with respect to the river may increase to a point where they are only rarely flooded, if at all. These terraces are considered old or mature alluvial terraces and can continue development toward climax (PNC) without the modifying influences of floods (Hansen 1989).

Early Seral Stage—The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type is an early seral stage (Hansen and others 1995).

Mid-Seral Stage—If disturbance (either human-caused or natural) does not eliminate the stand, the *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/ Recent Alluvial Bar) community type will progress to the relatively undisturbed mid-seral stage called the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. Normally, the understory of a pole to mature *Populus trichocarpa* (black cottonwood) stand is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper). As the *Populus, trichocarpa* (black cottonwood) overstory matures, becomes open, and finally, becomes decadent, conifers or *Acer negundo* (box-elder) are ready to replace them (Hansen and others 1995).

Late Seral to Climax (PNC) Stage—As the cottonwood stand dies, primary succession toward other communities will occur unless flooding deposits new sediments suitable for cottonwood seedlings. In the absence of sediment deposition, succession continues from the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type to the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type (Hansen and others 1995).

Secondary Successional Stages

The presence or absence of a particular understory community may aid in determining the degree of disturbance (both present and historical disturbance) on a particular site. On sites that are relatively undisturbed, the understory of the *Populus trichocarpa* (black cottonwood) community will contain a diverse, dense shrub layer dominated by *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common choke-cherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries). This represents the *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type. With moderate levels of grazing or browsing, there will be an increase in *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose), with a corresponding decrease in both the abundance and canopy cover of *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Ribes* (currants and gooseberries). If grazing or browsing pressures continue, the more desirable shrubs will be eliminated leaving *Clematis ligusticifolia* (western virgins-bower), *Rhus aromatica* (fragrant sumac) and *Rosa* species (rose) which can form a nearly impenetrable understory. This stage of disturbance-caused secondary succession is called the *Populus trichocarpa/ Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type.

If the disturbance is severe enough, *ALL* shrubs can be eliminated and the understory will be converted to an herbaceous one dominated by species such as *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Bromus* species (brome), and a variety of "weedy" forbs (e.g., the *Populus trichocarpa*/Herbaceous [black cottonwood/Herbaceous] community type). During the process of converting from a diverse, dense shrub understory to an herbaceous understory, the stand will open up resulting in a drier site. Finally the stand becomes decadent with the stand's appearance becoming one of widely spaced, dying cottonwoods. The site now has become so open and dry that the site's potential may have changed to one capable of supporting a variety of upland types. The presence of conifers and upland shrub species will usually indicate the site's potential. However, conversion may be slow due to heavy grazing pressures and the sod-forming characteristic of herbaceous species. Remnant shrubs and grasses, if present will help indicate the potential undergrowth composition (Hansen and others 1995).

Once the stand has converted from a shrub-dominated understory to one that is dominated by a variety of introduced herbaceous species, the ability to return the site to its former state (shrub-dominated) is very difficult. (It may be possible, but it will require a drastic change in management and may be very costly in terms of both labor and money.) Therefore, if a manager wants to maintain the stand in a shrub-dominated understory state, the most cost effective method is to change the management on the site ***BEFORE*** the site is too degraded (Hansen and others 1995).

SOILS

Fine textured mineral soils, composed of varying degrees of silts, clays and fine grain sands, form the surface layers of sites occupied by this community type. These alluvial layers, ranging from clay or silt loams to fine sands, may extend to depths exceeding well beyond 90 cm (36 in). Mottled and gleyed soil characteristics occur where the flux of near surface water tables facilitate oxidation and reduction reactions. Gravels and cobbles may be present in pockets and ill-defined layers throughout this zone. Underlying layers tend to be composed of coarse grain materials and large cobbles or rocks. Substrates tend to be well-drained, and are prone to flooding where sites occur on the active floodplain and on islands. Water tables are near the surface in the immediate vicinity of the channel, but drop proportionally for sites further removed from the active floodplain. *Populus trichocarpa* (black cottonwood) stands located on secondary (upper) floodplains may be 2 m (6.5 ft) or more above the water table, although capillary action may promote greater moisture availability upward in the soil solum. These sites may be characterized by moderate soil development due to the accumulation of leaf litter and absence of regular disturbance, and may be classified as Inceptisols or Entisols. Wood, rock and leaf litter are common components of the ground cover.

ADJACENT COMMUNITIES

Saturated sites may be dominated by cattail, bulrush, and *Phalaris arundinacea* (reed canarygrass). Various shrub communities may form a mosaic pattern across the riparian zone, dominated by *Betula occidentalis* (water birch), *Alnus incana* (mountain alder), *Crataegus douglasii* (black hawthorn), and assorted willows. The *Populus trichocarpa/Cornus stolonifera* (black cottonwood/red-osier dogwood) community type often occupies adjacent relatively undisturbed sites while the *Populus trichocarpa*/Herbaceous (black cottonwood/Herbaceous) community type occurs frequently on severely disturbed locations. The *Populus trichocarpa*/Recent Alluvial Bar (black cottonwood/Recent Alluvial Bar) community type may be present on locally deposited alluvium. Nearby uplands are often dominated by *Juniperus scopulorum* (Rocky Mountain juniper) woodlands, *Artemisia tridentata* (big sagebrush) shrublands and/or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production ranges from low to moderate due to the dense shrub understory within the stands. Forage production from dense thickets of *Symphoricarpos occidentalis* (western snowberry), when present, *Rhus aromatica* (fragrant sumac) and *Rosa woodsii* (woods rose) is low. Stands may be so dense that they exclude most livestock use. As the shrub understory is eliminated by continual prolonged heavy grazing or browsing, stands open and forage production increases accordingly due to the presence and amount of *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), or *Bromus* species (brome). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982), and the leaves of *Rosa woodsii* (woods rose) are considered fair to good livestock forage, particularly for sheep (Johnson and Nichols 1982). The forage value of *Rhus aromatica* (fragrant sumac) rates poorly for all forms of livestock. In some cases, stands may become so dense as to exclude most livestock. However, in arid regions where palatable species are scarce, this species may represent some of the only forage available and may be browsed heavily (Sampson and Jespersen 1963).

Timber

Timber productivity for the associated cottonwoods and conifers ranges from low to moderate. Complete stand removal may result in a shrub-dominated community with extremely limited cottonwood regeneration except for occasional sprouting from stumps (Hansen and others 1995). Unless sites receive new alluvial deposits with spring flooding to act as seedbeds for the next generation of cottonwoods, the future gallery forest potential is lost.

Wildlife

Ungulates, especially moose and whitetail deer, are common residents of these communities. Songbirds, raptors, and small mammals are also common, due to the high structural diversity and abundant food sources. *Populus trichocarpa* (black cottonwood) and *Rosa woodsii* (woods rose) are used by beaver for food and building materials (Allen 1983). Understory species provide food and cover for waterfowl, small birds, and mammals (Dittberner and Olson 1983).

The moderate structural understory diversity of *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982). Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

Fisheries
The streamside location of this *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is important in providing thermal cover, debris recruitment, and streambank stability. Its importance cannot be emphasized enough (see discussion in the Soil Management and Rehabilitation Opportunities section). *Symphoricarpos occidentalis* (western snowberry) and *Rosa woodsii* (woods rose) are excellent in controlling erosion along streams due to their rhizomatous nature. This is particularly important on the higher gradient streams where scouring by seasonal flooding is possible (Hansen and others 1995).

Fire
The *Populus trichocarpa/Symphoricarpos occidentalis* (black cottonwood/western snowberry) community type is susceptible to fire during the late summer and fall. *Populus trichocarpa* (black cottonwood) and associated shrubs are adapted to light and in some instances to moderate intensity fire and may produce new sprouts following burns. The ability of cottonwoods to produce new sprouts following fire seems to be dependent upon three criteria: 1) the particular species of cottonwood present in the stand. In general, *Populus angustifolia* (narrowleaf cottonwood) has a greater sprouting capability than *Populus trichocarpa* (black cottonwood), 2) the age of the trees in the stand. As the trees mature, the sprouting potential tends to decrease proportionally. As the trees reach the decadent stage of development, the sprouting potential is severely limited, and 3) the location of the water table. In general, the higher the water table throughout the growing season, the greater the ability for sprouts to survive. Therefore, if a manager wants to extend the life span of a stand of cottonwoods, fire ***MAY BE*** used as a tool in the pole to early mature stage of development. If fire is used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

Symphoricarpos occidentalis (western snowberry) is tolerant of fire. It can be injured by fire but usually sprouts, with stands becoming denser afterward. It is such a strong competitor, particularly in dense colonies, that it is not very compatible with most herbaceous vegetation. *Rosa woodsii* (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) makes it a good soil stabilizer (Hansen and others 1995). Sampson and Jespersen (1963) indicate that *Rhus aromatica* (fragrant sumac) is a sprouting species with a shallow and much branched rhizomatous root system. This not only makes it a good soil stabilizer and allows it to colonize large areas, but also permits it to actually increase overall coverage after a fire.

Soil Management and Rehabilitation Opportunities
Coarse textured soils are not as susceptible to compaction problems. This community type is subject to recurring scouring by floods and alluvium deposition. However, stands are relatively stable because of the strong rooting action of the associated species. Management should emphasize the importance of the understory shrub layer in streambank stabilization. This is particularly important on higher gradient stream channels where scouring by seasonal flooding occurs (Hansen and others 1995).

Managers should maintain a buffer strip of the *Populus angustifolia* (narrowleaf cottonwood) dominated community types adjacent to rivers and streams. These buffer strips reduce sedimentation, stabilize streambanks, and slow flood waters (Hansen and others 1995).

If the stand still has a fairly high water table, a dramatic change in management (i.e. elimination of livestock grazing and close monitoring of wildlife impacts) ***MAY*** allow the remnant shrub population to sprout and re-invade the stand. However, if the water table has dropped dramatically and the shrubs have been eliminated, the opportunity to reestablish a shrub understory dominated by desirable shrubs may be lost (Hansen and others 1995).

Where revegetation with woody species is wanted, desirable shrubs such as *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), and various species of *Salix* (willows) and *Ribes* (currants and gooseberries) may be well adapted to planting on disturbed sites. Rooted cuttings or nursery grown seedlings are easily established on moist, well-drained soils. Growth rates are rapid and the roots of established seedlings effectively stabilize recent bare alluvium. Remember: If the canopy cover of the trees in the stand has opened up too much and/or the water table has been lowered dramatically, the success of revegetation with desirable woody species will be low (Hansen and others 1995).

For rehabilitation of stands by the use of fire, see the discussion in the Fire Management section about the limitations of fire as a tool for rehabilitation. If fire is to be used to rehabilitate a stand, it is imperative that the stand is excluded from all livestock grazing for at least five years and that browsing by wildlife be closely monitored (Hansen and others 1995).

The following guidelines should be followed when attempting to revegetate sites with cuttings from cottonwoods (Swenson 1988): 1) Do not plant cottonwoods in saline or alkaline sites. 2) Select sites with substrates of sand, gravel, or small cobbles. Avoid sites that are classified as clays or have a thick clay layer. 3) Make cuttings from stands of open, young, rapidly growing trees, using only cuttings that are four years old or less. Remove the side branches, leaving only the tip and next two lower side branches. 4) Make the cuttings when the plants are completely dormant. 5) Soak the cuttings in water for 10 to 14 days. 6) Auger holes to a depth of the lowest anticipated growing season water table. 7) Place the cuttings in the augered holes the same day they are removed from the soak. Set the butt at the lowest anticipated growing season groundwater depth. Select cuttings of a length, which provides 1 to 2 m (3 to 6 ft) of cutting to remain above the soil surface. 8) Back fill the holes carefully to avoid air pockets. 9) Place tree guards around the cuttings if rodent or rabbit damage is anticipated. 10) As buds begin to swell along the cuttings, wipe them off the lower two-thirds of the cutting. 11) Plantings must be excluded from livestock grazing and big game browsing for two to three growing seasons. Some beaver control may be needed.

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well-drained soils, which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery-grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Because of its proximity to streams and rivers and its flat topography, recreational developments and transportation corridors are common within this type. Recreational opportunities are excellent for fishing, big game, and waterfowl hunting, and observing a variety of bird species (Hansen and others 1995).

Care must be taken when locating structures within this type due to flood hazard.

Symphoricarpos occidentalis (western snowberry) is an important food source for upland birds due to fruits that persist into the winter. Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of the *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community type has been documented for Montana (Hansen and others 1995). A similar community type was described by Youngblood and others (1985b) for eastern Idaho and western Wyoming, and by Padgett and others (1989) for Utah and southeastern Idaho. Major undergrowth shrubs were *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Salix bebbiana* (Bebb willow). A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Salix amygdaloides Community Type (Peach-Leaf Willow Community Type)

SALAMY (SAAM2)
Number of Stands Sampled = 24

LOCATION AND ASSOCIATED LANDFORMS

The *Salix amygdaloides* (peach-leaf willow) community type is an incidental type at lower elevations throughout valleys of southern and eastern Idaho. It forms narrow bands along oxbows, islands and on floodplains adjacent to major streams and rivers, or borders backwater areas on the margins of ponds and reservoirs. Sites range from 1,242-1,484 m (4,100-4,900 ft).

VEGETATION

Salix amygdaloides (peach-leaf willow), arborescent (multi-stalked) shrub or small tree that rarely exceeds 12 m (40 ft) in height (Hitchcock and others 1973), dominates the overstory in this community type, although *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood) may actually be present in the tallest layer. *Salix amygdaloides* (peach-leaf willow) frequently develops a decumbent or leaning growth form and downed woody material is common within stand interiors. However, this willow is capable of sprouting from these horizontal or fallen trunks, suggesting that this phenomenon is a natural form of regeneration or potential method of dispersal. Associated shrubs include willows, *Rosa woodsii* (woods rose), and *Cornus stolonifera* (red-osier dogwood). Mature stands of this type may form a closed overhead canopy, resulting in a sparse herbaceous understory layer characterized by low vigor. Various graminoids and forbs are represented by *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome), and *Cirsium arvense* (Canada thistle) (Table 34).

Table 34. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix amygdaloides* (peach-leaf willow) community type that are relatively undisturbed by livestock or wildlife (number = 5 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	10	0-10	20
Salix amygdaloides (peach-leaf willow)	71	40-98	100
Shrubs			
Cornus stolonifera (red-osier dogwood)	37	0-70	40
Rosa woodsii (woods rose)	3	0-3	20
Salix exigua (sandbar willow)	1	0-1	20
Salix lutea (yellow willow)	43	0-80	60
Solanum dulcamara (climbing nightshade)	30	0-30	20
Graminoids			
Agropyron repens (quackgrass)	3	0-3	40
Agrostis stolonifera (redtop)	3	0-3	20
Bromus inermis (smooth brome)	3	0-3	20
Carex lanuginosa (woolly sedge)	3	0-3	20
Phalaris arundinacea (reed canarygrass)	21	0-60	80
Poa palustris (fowl bluegrass)	50	0-60	40
Poa pratensis (Kentucky bluegrass)	3	0-3	60
Spartina pectinata (prairie cordgrass)	1	0-1	20
Forbs			
Apocynum cannabinum (hemp dogbane)	20	0-20	20
Aster species (aster)	11	0-20	40
Aster occidentalis (western aster)	1	0-1	20
Cicuta maculata (spotted water-hemlock)	20	0-20	20
Cirsium arvense (Canada thistle)	3	0-3	20
Forb	1	0-1	20
Geranium species (geranium; crane's-bill)	3	0-3	20
Glycyrrhiza lepidota (American licorice)	60	0-60	20
Lactuca serriola (prickly lettuce)	1	0-1	20
Lycopus asper (rough bugleweed)	20	0-20	20
Melilotus alba (white sweet-clover)	40	0-40	20
Melilotus officinalis (yellow sweet-clover)	40	0-40	20
Mentha arvensis (field mint)	7	0-20	60
Parietaria pensylvanica (Pennsylvania pellitory)	3	0-3	20
Potentilla species (cinquefoil)	20	0-20	20
Smilacina stellata (starry Solomon-plume)	3	0-3	20
Ferns and Allies			
Equisetum arvense (field horsetail)	40	0-40	20
Equisetum species (horsetail; scouring-rush)	2	0-3	40

SUCCESSIONAL INFORMATION

The *Salix amygdaloides* (peach-leaf willow) community type represents a successional stage for the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type, the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type, or habitat types in the *Salix lutea* (yellow willow) series. Other willow communities dominated by species of shorter stature than *Salix amygdaloides* (peach-leaf willow), such as *Salix exigua* (sandbar willow), are successional to this type on some locations (Table 35).

Disturbance Stages
Increased levels of disturbance tend to increase those disturbance-caused species already present. The weak, multi-stemmed nature of *Salix amygdaloides* (peach-leaf willow) is inadequate to withstand intense trampling and/or rubbing by livestock, and will result in excessive downed woody material if this type of disturbance occurs. Stands become inaccessible to livestock with prolonged, intense use. In other situations, the sites may be too wet so as to preclude most types of disturbances (Hansen and others 1995).

Table 35. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix amygdaloides* (peach-leaf willow) community type (number = 19 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Acer negundo (box-elder)	3	0-3	5
Fraxinus pennsylvanica (green ash)	2	0-3	16
Populus angustifolia (narrowleaf cottonwood)	3	0-3	11
Populus trichocarpa (black cottonwood)	10	0-10	5
Salix amygdaloides (peach-leaf willow)	65	30-98	100
Shrubs			
Amelanchier alnifolia (western serviceberry)	30	0-30	5
Clematis ligusticifolia (western virgins-bower)	20	0-20	5
Cornus stolonifera (red-osier dogwood)	19	0-40	26
Crataegus douglasii (black hawthorn)	2	0-3	11
Ribes americanum (black currant)	3	0-3	5
Ribes species (currant; gooseberry)	2	0-3	16
Ribes missouriense (Missouri gooseberry)	10	0-10	5
Ribes odoratum (buffalo currant)	9	0-20	16
Rosa acicularis (prickly rose)	42	0-80	11
Rosa species (rose)	40	0-40	5
Rosa woodsii (woods rose)	26	0-60	53
Rubus species (blackberry; raspberry)	20	0-20	5
Salix exigua (sandbar willow)	18	0-80	47
Salix lasiandra (Pacific willow)	3	0-3	5
Salix lutea (yellow willow)	20	0-20	5
Shepherdia argentea (thorny buffaloberry)	3	0-3	5
Solanum dulcamara (climbing nightshade)	6	0-10	11
Symphoricarpos albus (common snowberry)	12	0-20	11
Symphoricarpos occidentalis (western snowberry)	16	0-20	42
Tamarix chinensis (salt cedar)	3	0-3	5
Toxicodendron rydbergii (poison ivy)	1	0-1	5
Vitis riparia (river-bank grape)	1	0-1	5
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	5
Agropyron cristatum (crested wheatgrass)	20	0-20	5
Agropyron elongatum (tall wheatgrass)	20	0-20	5
Agropyron repens (quackgrass)	14	0-30	32
Agropyron smithii (western wheatgrass)	10	0-10	5
Agrostis stolonifera (redtop)	33	0-60	21
Bromus inermis (smooth brome)	46	0-80	37
Bromus japonicus (Japanese brome)	1	0-1	5
Bromus tectorum (cheatgrass)	10	0-10	5
Carex douglasii (Douglas's sedge)	1	0-1	5
Carex lanuginosa (woolly sedge)	11	0-20	11
Carex nebrascensis (Nebraska sedge)	20	0-20	5
Dactylis glomerata (orchard-grass)	1	0-1	5
Eleocharis palustris (common spikesedge)	10	0-10	5
Elymus canadensis (Canada wildrye)	11	0-20	11
Elymus cinereus (basin wildrye)	10	0-10	5
Elymus virginicus (Virginia wildrye)	3	0-3	5
Hordeum jubatum (foxtail barley)	6	0-10	11
Juncus balticus (Baltic rush)	3	0-3	5
Muhlenbergia asperifolia (alkali muhly)	40	0-40	5
Phalaris arundinacea (reed canarygrass)	5	0-10	16
Phleum pratense (common timothy)	10	0-10	5
Poa compressa (Canada bluegrass)	1	0-1	5
Poa palustris (fowl bluegrass)	7	0-20	26
Poa pratensis (Kentucky bluegrass)	35	0-80	53
Spartina pectinata (prairie cordgrass)	60	0-60	5
Stipa occidentalis (western needlegrass)	1	0-1	5
Forbs			
Ambrosia trifida (giant ragweed)	10	0-10	5
Arctium minus (common burdock)	1	0-1	5
Arctium species (burdock)	1	0-1	5
Artemisia dracunculus (tarragon)	1	0-1	5
Asclepias speciosa (showy milkweed)	1	0-1	5
Asparagus officinalis (asparagus)	3	0-3	5
Aster species (aster)	3	0-3	11
Aster hesperius (marsh aster)	3	0-3	5
Aster pansus (tufted white prairie aster)	1	0-1	5

Table 35 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Bryonia alba (white bryony)	50	0-50	5
Chenopodium album (lambsquarter)	2	0-3	11
Cirsium arvense (Canada thistle)	14	0-60	58
Cynoglossum officinale (common hound's-tongue)	3	0-3	5
Galium triflorum (sweetscented bedstraw)	3	0-3	5
Geum macrophyllum (larged-leaved avens)	2	0-3	11
Glycyrrhiza lepidota (American licorice)	15	0-60	26
Helenium autumnale (sneezeweed)	3	0-3	5
Helianthella uniflora (one-flowered helianthella)	20	0-20	5
Hippuris vulgaris (common mare's-tail)	3	0-3	5
Lactuca serriola (prickly lettuce)	2	0-3	16
Lycopus americanus (cut-leaved water horehound)	1	0-1	5
Medicago lupulina (black medic)	1	0-1	5
Medicago sativa (alfalfa)	1	0-1	5
Melilotus alba (white sweet-clover)	31	0-60	11
Melilotus officinalis (yellow sweet-clover)	31	0-60	11
Mentha arvensis (field mint)	1	0-1	16
Mentha species (mint)	80	0-80	5
Nepeta cataria (catnip)	3	0-3	5
Polygonum amphibium (water smartweed)	25	0-30	11
Rudbeckia occidentalis (black head)	1	0-1	5
Rumex crispus (curly dock)	4	0-10	21
Sisymbrium loeselii (Loeselii tumblemustard)	1	0-1	5
Smilacina stellata (starry Solomon-plume)	1	0-1	11
Solidago canadensis (Canada goldenrod)	1	0-1	5
Solidago species (goldenrod)	1	0-1	5
Solidago missouriensis (Missouri goldenrod)	3	0-3	11
Sonchus asper (prickly sowthistle)	1	0-1	5
Taraxacum officinale (common dandelion)	1	0-1	16
Trautvetteria caroliniensis (false bugbane)	1	0-1	5
Urtica dioica (stinging nettle)	2	0-3	21
Xanthium strumarium (common cockleburr)	2	0-3	11
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	10	0-10	5

SOILS

Soils occupied by this community type are commonly classified as Entisols (Aquents and Fluvents) or Mollisols (Aquolls and Borolls) (Hansen and others 1995). Surface soil textures range from silty clay loams to sandy loams, with upper horizons reaching depths in excess of 1 m (39 in). Underlying layers may consist of coarse sands and gravels, and tend to be well-drained. Water tables are usually within 1 m (39 in) of the soil surface throughout the growing season, facilitating the development of gleyed and mottled soil feature in the upper soil horizons. *Salix amygdaloides* (peach-leaf willow) can tolerate weak saline and alkali soils, poorly drained soils, and prolonged flooding.

ADJACENT COMMUNITIES

Cattail, bulrush, sedges, and *Phalaris arundinacea* (reed canarygrass) communities may border the *Salix amygdaloides* (peach-leaf willow) community type on saturated sites, while *Populus trichocarpa* (black cottonwood) and *Populus angustifolia* (narrowleaf cottonwood) community types often dominant drier floodplain locations. Various shrub communities may form a mosaic pattern on adjacent riparian zones, dominated by *Betula occidentalis* (water birch), *Cornus stolonifera* (red-osier dogwood), and assorted willows. Nearby uplands are dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush) shrublands and/or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Wet conditions and the limited size and extent of stands of this type generally limit livestock use. However, livestock use during wet periods can either lead to the churning of soil or soil compaction (Hansen and others 1995).

Wildlife

The high structural diversity of stands of the *Salix amygdaloides* (peach-leaf willow) community type provides excellent thermal and hiding cover for all categories of wildlife (Hansen and others 1995).

Fisheries

The *Salix amygdaloides* (peach-leaf willow) community type provides limited thermal cover for fish. However, it is an effective stabilizer of streambanks and managers should attempt to protect them whenever possible (Hansen and others 1995).

Fire

Limited information is available on the effects of fire on *Salix amygdaloides* (peach-leaf willow). However, based on our understanding of other willow species, we would assume *Salix amygdaloides* (peach-leaf willow) to be a prolific sprouter after all but the hottest fires (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
High water tables and seasonal flooding should limit activities and development in most of these stands. Care must be taken in the placement of roads and other developments in sites that permit these activities (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Stands of this community type provide excellent opportunities for viewing wildlife species. However, the dense nature of most stands and the high water tables associated with them tend to limit access. The large mosquito populations may also reduce he use of this type (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = forested wetland; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

The *Salix amygdaloides* (peach-leaf willow) community type has been described by Hansen and others (1995) for Montana.

Salix bebbiana Community Type
(Bebb Willow Community Type)

SALBEB (SABE2)
Number of Stands Sampled = 21

LOCATION AND ASSOCIATED LANDFORMS

The *Salix bebbiana* (Bebb willow) community type is a minor type at moderately high elevations throughout foothills and mountain valleys of southcentral and eastern Idaho. Sites range from 1,818 to 2,121 m (6,000 to 7,000 ft). This community type often persists as narrow bands paralleling abandoned oxbows on upper (secondary) floodplains; however, it also occurs on the active, lower banks of major river systems, in proximity to seeps or springs, or on alluvial terraces in U-shaped canyons.

VEGETATION

The *Salix bebbiana* (Bebb willow) community type, a browsing or grazing disclimax, generally perseveres under an intense disturbance regime unsuitable for other willows. Long-lived *Salix bebbiana* (Bebb willow) often appear as short, thick-trunked shrubs in widely scattered or clumped stands depending on local topography. Due to the impact of livestock, mature individuals take on an umbrelled or umbrella-like appearance. Where grazing is intense, associated shrubs may be virtually nonexistent, although as pressure by livestock diminishes, a diverse shrub component may reestablish. Disturbance-induced herbaceous species may include *Poa pratensis* (Kentucky bluegrass), *Phleum pratensis* (common timothy), *Agrostis stolonifera* (redtop), and *Solidago canadensis* (Canada goldenrod). On less disturbed sites, *Osmorhiza chilensis* (mountain sweet-cicely), *Galium triflorum* (sweetscented bedstraw), and *Smilacina racemosa* (false spikenard) may be present (Table 36).

Table 36. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Salix bebbiana* (Bebb willow) community type (number = 21 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	3	0-10	29
Rosa woodsii (woods rose)	10	0-30	52
Salix bebbiana (Bebb willow)	25	1-90	100
Graminoids			
Agrostis stolonifera (redtop)	14	0-20	48
Bromus ciliatus (fringed brome)	3	0-10	29
Juncus balticus (Baltic rush)	21	0-40	38
Phleum pratense (common timothy)	14	0-40	43
Poa pratensis (Kentucky bluegrass)	18	0-60	76
Forbs			
Achillea millefolium (common yarrow)	2	0-10	33
Aster occidentalis (western aster)	6	0-20	29
Cirsium arvense (Canada thistle)	6	0-20	29
Galium boreale (northern bedstraw)	1	0-1	29
Geum macrophyllum (larged-leaved avens)	3	0-20	43
Iris missouriensis (Rocky Mountain iris)	1	0-1	29
Smilacina stellata (starry Solomon-plume)	14	0-40	29
Solidago canadensis (Canada goldenrod)	8	0-40	43
Taraxacum officinale (common dandelion)	3	0-10	38
Trifolium repens (white clover)	10	0-40	33
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	4	0-20	29

SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Salix bebbiana* (Bebb willow) community type represents a browsing/grazing disclimax of the *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow) dominated habitat types.

Salix bebbiana (Bebb willow) appears to be a highly palatable willow. However, this high level of palatability does not negatively affect the status of *Salix bebbiana* (Bebb willow) on a site. In fact, *Salix bebbiana* (Bebb willow) seems to have evolved a physiological tolerance to browsing and remains on a site under all but the most severe conditions, such as sustained long-term browsing. This tolerance to repeated browsing allows *Salix bebbiana* (Bebb willow) to increase at the expense of less browsing-tolerant willow species such as *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix drummondiana* (Drummond willow). On severely degraded sites with prolonged levels of browsing, *Salix bebbiana* (Bebb willow) is typically the last willow to remain on the site. The dominance of the undergrowth by introduced species can aid in determining the extent of the disturbance (Hansen and others 1995).

SOILS

A litter/duff layer generally less than 10 cm (4 in) deep covers a nutrient-rich, organic layer indicative of

Mollisols, up to 45 cm (18 in) or more in depth. Surface soil textures range from silt loams to clay loams. Alluvial coarse sands, gravels and small, medium and large cobbles comprise the lower horizons. Occasionally, large rocks are present as well. Water tables probably occur within 60 cm (24 in) of the surface, but can vary according to local site features.

ADJACENT COMMUNITIES

The *Salix bebbiana* (Bebb willow) community type may be associated with a mosaic of other willows communities along riparian corridors and across large floodplains where disturbance is minimal. *Populus tremuloides* (quaking aspen), *Betula occidentalis* (water birch), or *Alnus incana* (mountain alder) stands may also be present, as well as *Wyethia* (mule's-ears) meadows. Excessive disturbance tends to limit the diversity of other shrub species, resulting in a savannah-like environment with sporadic stands of *Salix bebbiana* (Bebb willow) over a grass, or where sufficient moisture persists, a sedge understory. Uplands are dominated by *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), or *Artemisia tridentata* (big sagebrush)/grassland steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands are usually characterized by widely spaced shrubs, allowing for easy livestock access. Forage production is moderate to high, composed primarily of introduced species. As a result, heavy use by livestock is common. In some stands, the willows may have a reduced vigor, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows showed a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Where this community type occurs on winter game ranges, browsing of *Salix bebbiana* (Bebb willow) is often high enough to reduce both plant vigor and regeneration. Gaffney (1941) reported that *Salix bebbiana* (Bebb willow) is a highly valuable browse for elk, with heavy utilization common. Continued use may lead to a conversion to herbaceous communities such as the *Poa palustris* (fowl bluegrass) and *Poa pratensis* (Kentucky bluegrass) community types. Moose and beaver heavily utilize most species of willow.

Fisheries

Willow communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Sedges and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows (Hansen and others 1995).

Fire

Salix bebbiana (Bebb willow) sprouts rapidly following fire (Haeussler and Coates 1986). Quick, hot fires maximize sprouting, while slower burns cause more damage to plants. Prescribed burning is a commonly used wildlife management tool to rejuvenate decadent communities dominated by *Salix bebbiana* (Bebb willow).

Soil Management and Rehabilitation Opportunities

The *Salix bebbiana* (Bebb willow) community type is a browsing/grazing disclimax and has historically received high use by wildlife and cattle. Soils and streambanks are highly susceptible to trampling damage, especially when soils are fine textured or wet. Deferring grazing until sites are drier can reduce trampling and compaction problems (Marlow 1984).

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

Salix bebbiana (Bebb willow) is valuable for revegetating streambanks. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results with the cuttings rooting freely along the entire length of the stem. Roots and shoots from cuttings can be expected to appear 10-20 days after planting. However, nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Hansen and others 1995 describe this community type for Montana. A similar *Salix bebbiana* (Bebb willow) community type was identified by Padgett and others (1989) in Utah, with undergrowth dominated by *Poa pratensis* (Kentucky bluegrass) and other mesic grasses. Chadde and others (1988) defined a *Salix bebbiana/ Agrostis stolonifera* (Bebb willow/redtop) community type for northern Yellowstone National Park. A somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Salix drummondiana/Calamagrostis canadensis Habitat Type (Drummond Willow/Bluejoint Reedgrass Habitat Type)

SALDRU/CALCAN (SADR/CACA4)
Number of Stands Sampled = 15

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type is an incidental type at mid to moderately high elevations in the mountainous regions of eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This habitat type may occur on level outwash plains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed impoundments. The physical site requirements of *Salix drummondiana* (Drummond willow) correspond with those of *Salix lutea* (yellow willow) and *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these species are dispersed along an elevation gradient, with *Salix drummondiana* (Drummond willow) types occupying locations at higher elevations than either the mid-range *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) types or the lower elevational *Salix lutea* (yellow willow) types.

VEGETATION

Salix drummondiana (Drummond willow) forms dense, impenetrable stands in the absence of grazing or browsing pressure. Other willows, particularly *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow), are often present with reduced coverages. Lower shrub layers may be composed of *Rubus parviflorus* (thimbleberry) and *Ribes* (currants and gooseberries). The understory component is dominated by *Calamagrostis canadensis* (bluejoint reedgrass), although a diversity of other graminoids and forbs, such as *Calamagrostis stricta* (narrow-spiked reedgrass), *Senecio triangularis* (arrowleaf groundsel), *Geum macrophyllum* (larged-leaved avens), *Epilobium angustifolium* (fireweed), and *Heracleum lanatum* (cow-parsnip), also occur to a minor degree (Table 37).

Table 37. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type (number = 5 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Picea species (spruce)	3	0-3	20
Pinus contorta (lodgepole pine)	10	0-10	20
Shrubs			
Lonicera involucrata (twin-berry)	1	0-1	20
Ribes species (currant; gooseberry)	2	0-3	60
Ribes hudsonianum (stinking currant)	1	0-1	20
Ribes setosum (Missouri gooseberry)	10	0-10	20
Rosa acicularis (prickly rose)	3	0-3	20
Salix boothii (Booth willow)	2	0-3	60
Salix drummondiana (Drummond willow)	42	20-70	100
Salix geyeriana (Geyer willow)	3	0-3	20
Graminoids			
Bromus ciliatus (fringed brome)	1	0-1	40
Bromus inermis (smooth brome)	1	0-1	20
Calamagrostis canadensis (bluejoint reedgrass)	35	0-60	80
Calamagrostis stricta (narrow-spiked reedgrass)	20	0-20	20
Carex aquatilis (water sedge)	1	0-1	20
Carex canescens (gray sedge)	1	0-1	20
Carex disperma (soft-leaved sedge)	1	0-1	20
Carex microptera (small-winged sedge)	3	0-3	20
Carex pachystachya (thick-headed sedge)	1	0-1	20
Carex rostrata (beaked sedge)	1	0-1	20
Deschampsia cespitosa (tufted hairgrass)	1	0-1	20
Poa palustris.(fowl bluegrass)	7	0-10	40
Trisetum wolfii (Wolf's trisetum)	1	0-1	20
Forbs			
Angelica arguta (sharptooth angelica)	1	0-1	40
Arabis glabra (towermustard)	1	0-1	20
Arnica chamissonis (meadow arnica)	3	0-3	20
Aster modestus (few-flowered aster)	10	0-10	40
Aster occidentalis (western aster)	1	0-1	80
Epilobium angustifolium (fireweed)	1	0-1	60
Epilobium ciliatum (common willow-herb)	3	0-3	20

Table 37 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Galium triflorum (sweetscented bedstraw)	1	0-1	20
Geranium richardsonii (white geranium)	1	0-1	20
Geum macrophyllum (larged-leaved avens)	1	0-1	80
Heracleum lanatum (cow-parsnip)	2	0-3	40
Mertensia ciliata (mountain bluebell)	2	0-3	60
Pedicularis groenlandica (elephant's head)	1	0-1	40
Pyrola asarifolia (pink wintergreen)	2	0-3	40
Senecio pseudaureus (streambank groundsel)	1	0-1	20
Senecio triangularis (arrowleaf groundsel)	1	0-1	60
Smilacina stellata (starry Solomon-plume)	1	0-1	60
Taraxacum officinale (common dandelion)	1	0-1	20
Thalictrum occidentale (western meadowrue)	6	0-10	40
Urtica dioica (stinging nettle)	1	0-1	40
Veronica americana (American speedwell)	1	0-1	20
Viola species (violet)	10	0-10	20
Ferns and Allies			
Equisetum arvense (field horsetail)	2	0-3	40

SUCCESSIONAL INFORMATION

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type tends to occupy moist to slightly saturated sites. Wetter conditions promote the development of the *Salix drummondiana/Carex rostrata* (Drummond willow/ beaked sedge) habitat type. If physical site alterations cause the riparian zone to become moderately drier, coniferous or deciduous tree dominated communities, notably *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Populus tremuloides* (quaking aspen), can represent the new climax vegetation. Similarly, where sites become inundated for longer periods due to beaver dams or other impoundments, sedges-dominated communities will prevail as willows die off. Utilization influences the direction of succession as well as physiological changes. Prolonged grazing pressure by livestock ultimately eliminates the presence of native species, causing a shift toward the drier *Salix drummondiana* (Drummond willow) community type (Table 38).

Table 38. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix drummondiana/ Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type (number = 10 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	3	0-3	10
Picea species (spruce)	1	0-1	30
Pinus contorta (lodgepole pine)	7	0-10	20
Shrubs			
Alnus incana (mountain alder)	4	0-10	40
Cornus stolonifera (red-osier dogwood)	23	0-70	40
Linnaea borealis (twinflower)	3	0-3	10
Lonicera involucrata (twin-berry)	1	0-1	10
Ribes species (currant; gooseberry)	2	0-3	20
Ribes hudsonianum (stinking currant)	10	0-10	10
Ribes lacustre (swamp currant)	10	0-10	10
Ribes setosum (Missouri gooseberry)	6	0-10	40
Rosa acicularis (prickly rose)	1	0-1	20
Rubus idaeus (red raspberry)	1	0-1	20
Rubus parviflorus (thimbleberry)	3	0-3	10
Salix bebbiana (Bebb willow)	1	0-1	10
Salix boothii (Booth willow)	10	0-20	60
Salix drummondiana (Drummond willow)	38	10-80	100
Salix geyeriana (Geyer willow)	2	0-3	40
Salix pseudomonticola (mountain willow)	40	0-40	10
Graminoids			
Agrostis exarata (spike bentgrass)	2	0-3	20
Agropyron repens (quackgrass)	1	0-1	10
Agrostis stolonifera (redtop)	2	0-3	20
Bromus ciliatus (fringed brome)	6	0-10	40
Bromus inermis (smooth brome)	3	0-3	10
Calamagrostis canadensis (bluejoint reedgrass)	18	10-50	100
Calamagrostis stricta (narrow-spiked reedgrass)	10	0-10	10
Carex disperma (soft-leaved sedge)	1	0-1	10
Carex limosa (mud sedge)	10	0-10	10
Carex microptera (small-winged sedge)	1	0-1	30
Carex pachystachya (thick-headed sedge)	1	0-1	10
Carex rostrata (beaked sedge)	1	0-1	20
Carex scopulorum (Holm's Rocky Mountain sedge)	1	0-1	10
Deschampsia cespitosa (tufted hairgrass)	10	0-10	10
Elymus canadensis (Canada wildrye)	3	0-3	10
Glyceria grandis (American mannagrass)	3	0-3	10
Glyceria striata (fowl mannagrass)	6	0-10	20
Juncus ensifolius (dagger-leaf rush)	1	0-1	10
Luzula parviflora (small-flowered woodrush)	1	0-1	10

Table 38 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Phleum alpinum (alpine timothy)	1	0-1	10
Poa palustris (fowl bluegrass)	10	0-10	10
Poa pratensis (Kentucky bluegrass)	1	0-1	30
Forbs			
Achillea millefolium (common yarrow)	2	0-3	30
Actaea rubra (baneberry)	2	0-3	20
Allium brevistylum (short-style onion)	1	0-1	10
Angelica arguta (sharptooth angelica)	2	0-3	30
Antennaria microphylla (rosy pussy-toes)	1	0-1	10
Aquilegia flavescens (yellow columbine)	1	0-1	10
Arnica mollis (hairy arnica)	1	0-1	10
Aster foliaceus (leafy aster)	1	0-1	10
Aster modestus (few-flowered aster)	3	0-10	70
Aster occidentalis (western aster)	8	0-20	30
Cirsium arvense (Canada thistle)	10	0-10	10
Cirsium scariosum (elk thistle)	1	0-1	10
Collomia linearis (narrow-leaf collomia)	10	0-10	10
Epilobium angustifolium (fireweed)	1	0-1	40
Epilobium ciliatum (common willow-herb)	1	0-1	10
Epilobium glaberrimum (smooth willow-herb)	10	0-10	10
Fragaria virginiana (Virginia strawberry)	10	0-20	30
Galium aparine (goose-grass)	3	0-3	10
Galium boreale (northern bedstraw)	1	0-1	10
Galium trifidum (small bedstraw)	4	0-10	30
Galium triflorum (sweetscented bedstraw)	1	0-1	30
Geranium richardsonii (white geranium)	2	0-3	20
Geum macrophyllum (larged-leaved avens)	1	0-3	60
Habenaria dilatata (white orchis)	1	0-1	10
Heracleum lanatum (cow-parsnip)	6	0-20	70
Mentha arvensis (field mint)	6	0-10	20
Mertensia ciliata (mountain bluebell)	1	0-1	30
Mimulus lewisii (Lewis' monkey-flower)	1	0-1	10
Osmorhiza chilensis (mountain sweet-cicely)	6	0-10	20
Potentilla gracilis (slender cinquefoil)	1	0-1	10
Pyrola asarifolia (pink wintergreen)	1	0-1	10
Pyrola chlorantha (green wintergreen)	3	0-3	10
Ranunculus macounii (Macoun's buttercup)	1	0-1	10
Saxifraga arguta (brook saxifrage)	1	0-1	10
Senecio pseudaureus (streambank groundsel)	5	0-10	30
Senecio triangularis (arrowleaf groundsel)	4	0-10	40
Smilacina stellata (starry Solomon-plume)	1	0-1	30
Stellaria longipes (longstalk starwort)	10	0-10	10
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	10
Taraxacum officinale (common dandelion)	3	0-10	50
Thalictrum occidentale (western meadowrue)	2	0-3	30
Urtica dioica (stinging nettle)	4	0-10	40
Veronica verna (spring speedwell)	1	0-1	10
Viola species (violet)	7	0-10	30
Ferns and Allies			
Botrychium lunaria (moonwort grapefern)	1	0-1	10
Equisetum arvense (field horsetail)	14	0-40	30
Equisetum hyemale (common scouring-rush)	1	0-1	10

SOILS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type occurs over a range of soil types, including Entisols, Histosols, and Mollisols (Hansen and others 1995). Some sites are primarily sandy/sandy loam soils underlain by gravels, cobbles, and various larger sized rocks. Slightly elevated zones above the active floodplain can have 2.5 to 5 cm (1 to 2 in) of litter/duff. In regions characterized by fines and silts, organic horizons, often with a high component of root/fibrous plant material, reach 45 cm (18 in) or more below the surface. When saturated, these soils typically take on a muck-like consistency. Fine and coarse sands often compose the underlying layers with a moderate gravel element. A shallow litter and duff layer will develop where flood disturbance is infrequent. This habitat type tends to occupy moist sites with water tables generally near (60 cm [24 in]), if not at, the soil surface. Mottled and gleyed soils, the result of oxidation/reduction reactions, are common due to shallow water tables.

ADJACENT COMMUNITIES

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type occupies slightly wetter sites, while the *Salix drummondiana* (Drummond willow) community type may be present on drier, disturbed areas. Willows often establish along riparian corridors with an assortment of other shrub and tree communities, forming a mosaic of mixed vegetation types. Generally, a variety of willow and shrub types, such as *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), *Cornus stolonifera* (red-osier dogwood) and *Prunus virginiana* (common chokecherry), are present with scattered stands of tree-dominated communities represented by *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Populus tremuloides* (quaking aspen). Uplands may be dominated by *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate.

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows showed a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during rest periods between long growing seasons that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The linear nature of many of these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to utilize most species of willows heavily. Elk may make moderate summer use of *Calamagrostis canadensis* (bluejoint reedgrass) (Kufeld 1973).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Willow communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that armor streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Sedges and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows (Hansen and others 1995).

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts. After burning, sites should be removed from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Soil Management and Rehabilitation Opportunities
Wet, fine textured soils are highly susceptible to trampling damage by cattle. Grazing should be deferred until soils are drier to protect streambanks and minimize damage (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix drummondiana (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). In addition, communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix drummondiana/Carex rostrata Habitat Type (Drummond Willow/Beaked Sedge Habitat Type)

SALDRU/CARROS (SADR/CARO6)
Number of Stands Sampled = 30

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type is an incidental type at mid to moderately high elevations in the mountainous regions of eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This habitat type may occur on level outwash plains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed impoundments. The physical site requirements of *Salix drummondiana* (Drummond willow) correspond with those of *Salix lutea* (yellow willow) and *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these species are dispersed along an elevation gradient, with *Salix drummondiana* (Drummond willow) types occupying locations at higher elevations than either the mid-range *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) types or the lower elevational *Salix lutea* (yellow willow) types.

VEGETATION

In Idaho, *Salix drummondiana* (Drummond willow) forms dense, impenetrable stands in the absence of grazing or browsing pressure. Other willows, particularly *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow), are usually present with reduced coverages. Lower shrub layers may be composed of *Alnus incana* (mountain alder) or *Ribes* (currant). The herbaceous undergrowth is dominated by sedges, primarily *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). Where sites are subject to grazing pressures, *Carex nebrascensis* (Nebraska sedge), *Poa pratensis* (Kentucky bluegrass) and other disturbance-induced types become prevalent. A diversity of other graminoids and forbs are present; however, they occur with limited constancies and coverages. *Geum macrophyllum* (large leaved avens) and *Epilobium ciliatum* (common willow-herb) are the most common forb associated with this type (Table 39).

Table 39. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type (number = 10 stands)

Table 39 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Alnus incana (mountain alder)	8	0-20	30
Betula glandulosa (bog birch)	20	0-20	20
Cornus stolonifera (red-osier dogwood)	1	0-1	20
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	10
Ribes species (currant; gooseberry)	4	0-10	30
Ribes hudsonianum (stinking currant)	1	0-1	10
Rubus idaeus (red raspberry)	1	0-1	10
Salix boothii (Booth willow)	15	0-20	60
Salix drummondiana (Drummond willow)	48	30-60	100
Salix geyeriana (Geyer willow)	1	0-1	30
Salix pseudomonticola (mountain willow)	16	0-30	20
Graminoids			
Agrostis exarata (spike bentgrass)	1	0-1	10
Agrostis scabra (tickle-grass)	1	0-1	10
Agrostis thurberiana (thurber bentgrass)	20	0-20	10
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	10
Carex aquatilis (water sedge)	34	0-60	30
Carex lanuginosa (woolly sedge)	6	0-10	20
Carex rostrata (beaked sedge)	30	0-70	90
Carex vesicaria (inflated sedge)	80	0-80	10
Deschampsia cespitosa (tufted hairgrass)	1	0-1	20
Glyceria grandis (American mannagrass)	3	0-3	10
Glyceria striata (fowl mannagrass)	1	0-1	10
Juncus balticus (Baltic rush)	1	0-1	10
Juncus ensifolius (dagger-leaf rush)	6	0-10	20
Phalaris arundinacea (reed canarygrass)	30	0-30	10
Poa palustris (fowl bluegrass)	6	0-10	20
Scirpus microcarpus (small-flowered bulrush)	1	0-1	10
Forbs			
Aster modestus (few-flowered aster)	5	0-20	50
Aster occidentalis (western aster)	10	0-10	10
Epilobium ciliatum (common willow-herb)	3	0-10	80
Galium trifidum (small bedstraw)	3	0-10	50
Geum macrophyllum (larged-leaved avens)	3	0-10	60
Habenaria dilatata (white orchis)	1	0-1	10
Mentha arvensis (field mint)	7	0-10	30
Pedicularis groenlandica (elephant's head)	10	0-10	10
Petasites sagittatus (arrowleaf coltsfoot)	1	0-1	10
Polemonium occidentale (western polemonium)	10	0-10	10
Potentilla palustris (purple cinquefoil)	1	0-1	10
Pyrola asarifolia (pink wintergreen)	1	0-1	10
Saxifraga arguta (brook saxifrage)	20	0-20	10
Senecio pseudaureus (streambank groundsel)	1	0-1	10
Senecio triangularis (arrowleaf groundsel)	1	0-1	10
Stellaria longipes (longstalk starwort)	7	0-20	30
Veronica americana (American speedwell)	6	0-10	20
Viola species (violet)	1	0-1	10
Ferns and Allies			
Equisetum arvense (field horsetail)	8	0-10	40
Equisetum hyemale (common scouring-rush)	1	0-1	10

SUCCESSIONAL INFORMATION

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type occupies moderately saturated to moist sites, while the *Salix drummondiana/ Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type favors slightly drier conditions. However, if physical site alterations cause further desiccation of the riparian zone, coniferous or deciduous tree dominated communities, notably *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Populus tremuloides* (quaking aspen), may represent the new climax vegetation. Similarly, where sites become inundated for longer periods due to beaver dams or other impoundments, sedge-dominated communities prevail as willows die off. Utilization influences the direction of succession as well as physiological changes. Prolonged grazing pressure by livestock can ultimately eliminate the presence of native species, causing a shift toward the drier *Salix drummondiana* (Drummond willow) community type, which represents a grazing disclimax (Table 40).

Table 40. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix drummondiana/ Carex rostrata* (Drummond willow/beaked sedge) habitat type (number = 20 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	1	0-1	5
Picea species (spruce)	2	0-3	15
Pinus contorta (lodgepole pine)	2	0-3	20

Table 40 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Pseudotsuga menziesii (Douglas fir)	1	0-1	5
Shrubs			
Alnus incana (mountain alder)	14	0-20	35
Amelanchier alnifolia (western serviceberry)	1	0-1	5
Betula glandulosa (bog birch)	13	0-30	25
Cornus stolonifera (red-osier dogwood)	6	0-20	20
Lonicera involucrata (twin-berry)	6	0-10	10
Potentilla fruticosa (shrubby cinquefoil)	2	0-3	15
Rhamnus alnifolia (alder buckthorn)	15	0-20	10
Ribes species (currant; gooseberry)	10	0-20	20
Ribes hudsonianum (stinking currant)	5	0-10	25
Ribes inerme (whitestem gooseberry)	20	0-20	5
Rosa acicularis (prickly rose)	1	0-1	5
Rosa species (rose)	1	0-1	5
Rosa woodsii (woods rose)	10	0-10	5
Rubus idaeus (red raspberry)	10	0-10	5
Salix bebbiana (Bebb willow)	14	0-40	25
Salix boothii (Booth willow)	15	0-30	45
Salix drummondiana (Drummond willow)	32	10-60	100
Salix geyeriana (Geyer willow)	4	0-10	30
Salix species (willows)	40	0-40	5
Salix lutea (yellow willow)	10	0-10	5
Salix planifolia (planeleaf willow)	1	0-1	15
Salix wolfii (Wolf's willow)	7	0-10	10
Vaccinium cespitosum (dwarf huckleberry)	10	0-10	5
Graminoids			
Agrostis exarata (spike bentgrass)	1	0-1	5
Agrostis species (bentgrass)	6	0-10	10
Agropyron repens (quackgrass)	3	0-3	5
Agrostis scabra (tickle-grass)	8	0-10	20
Agrostis stolonifera (redtop)	10	0-10	15
Alopecurus aequalis (short-awn foxtail)	1	0-1	5
Alopecurus alpinus (alpine foxtail)	10	0-10	5
Alopecurus pratensis (meadow foxtail)	10	0-10	5
Bromus ciliatus (fringed brome)	4	0-10	30
Bromus species (brome)	2	0-3	10
Calamagrostis canadensis (bluejoint reedgrass)	15	0-40	35
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	5
Carex aquatilis (water sedge)	18	0-30	25
Carex aurea (golden sedge)	1	0-1	5
Carex canescens (gray sedge)	13	0-30	20
Carex cusickii (Cusick's sedge)	20	0-20	5
Carex species (sedges)	1	0-1	5
Carex illota (sheep sedge)	10	0-10	5

Table 40 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Carex lanuginosa (woolly sedge)	10	0-10	5
Carex lenticularis (lentil-fruited sedge)	10	0-10	5
Carex leptalea (bristle-stalked sedge)	10	0-10	5
Carex microptera (small-winged sedge)	6	0-10	10
Carex nebrascensis (Nebraska sedge)	20	0-30	10
Carex pachystachya (thick-headed sedge)	6	0-10	10
Carex rostrata (beaked sedge)	31	0-60	90
Carex vesicaria (inflated sedge)	6	0-10	10
Cinna latifolia (drooping woodreed)	1	0-1	5
Deschampsia cespitosa (tufted hairgrass)	6	0-10	20
Elymus cinereus (basin wildrye)	1	0-1	5
Glyceria elata (tall mannagrass)	1	0-1	5
Glyceria grandis (American mannagrass)	8	0-10	20
Glyceria striata (fowl mannagrass)	1	0-1	15
Hordeum brachyantherum (meadow barley)	7	0-10	15
Juncus balticus (Baltic rush)	11	0-30	25
Juncus ensifolius (dagger-leaf rush)	2	0-3	15
Luzula campestris (field woodrush)	1	0-1	10
Phalaris arundinacea (reed canarygrass)	80	0-80	5
Phleum pratense (common timothy)	5	0-10	35
Poa compressa (Canada bluegrass)	10	0-10	5
Poa palustris (fowl bluegrass)	10	0-30	45
Poa pratensis (Kentucky bluegrass)	5	0-20	45
Scirpus microcarpus (small-flowered bulrush)	1	0-1	10
Trisetum wolfii (Wolf's trisetum)	4	0-10	30
Forbs			
Achillea millefolium (common yarrow)	3	0-10	25
Actaea rubra (baneberry)	1	0-1	5
Angelica arguta (sharptooth angelica)	8	0-10	15
Antennaria microphylla (rosy pussy-toes)	1	0-1	5
Antennaria neglecta (field pussy-toes)	3	0-3	5
Antennaria umbrinella (umber pussy-toes)	1	0-1	5
Arenaria macrophylla (bigleaf sandwort)	3	0-3	5
Arnica chamissonis (meadow arnica)	2	0-3	10
Aster laevis (smooth aster)	1	0-1	5
Aster modestus (few-flowered aster)	4	0-10	30
Aster occidentalis (western aster)	8	0-20	40
Bidens cernua (nodding beggar-ticks)	1	0-1	5
Castilleja miniata (scarlet paintbrush)	2	0-3	10

Table 40 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Cirsium arvense (Canada thistle)	1	0-3	25
Cirsium scariosum (elk thistle)	11	0-30	15
Descurainia richardsonii (Richardson's tansymustard)	1	0-1	5
Epilobium angustifolium (fireweed)	1	0-1	25
Epilobium ciliatum (common willow-herb)	3	0-10	50
Forb	20	0-20	5
Fragaria virginiana (Virginia strawberry)	5	0-10	30
Galium boreale (northern bedstraw)	1	0-1	5
Galium trifidum (small bedstraw)	4	0-10	40
Galium triflorum (sweetscented bedstraw)	2	0-3	15
Geranium richardsonii (white geranium)	2	0-3	15
Geranium viscosissimum (sticky geranium)	1	0-1	5
Geum macrophyllum (larged-leaved avens)	6	0-20	60
Geum rivale (water avens)	1	0-1	5
Habenaria dilatata (white orchis)	1	0-1	15
Habenaria hyperborea (northern green bog-orchid)	1	0-1	5
Heracleum lanatum (cow-parsnip)	4	0-10	20
Lemna minor (water lentil)	1	0-1	10
Ligusticum tenuifolium (slender-leafed licorice-root)	10	0-10	5
Lupinus argenteus (silvery lupine)	1	0-1	5
Mentha arvensis (field mint)	7	0-20	30
Mertensia ciliata (mountain bluebell)	6	0-10	10
Mimulus guttatus (common monkey-flower)	6	0-10	20
Mimulus moschatus (musk-flower)	10	0-10	5
Parnassia palustris (northern grass-of-parnassus)	10	0-10	5
Pedicularis groenlandica (elephant's head)	2	0-3	15
Penstemon procerus (small-flowered penstemon)	1	0-1	5
Perideridia gairdneri (Gairdner's yampah)	1	0-1	10
Petasites sagittatus (arrowleaf coltsfoot)	25	0-40	10
Polygonum amphibium (water smartweed)	10	0-10	5
Polemonium occidentale (western polemonium)	1	0-1	5
Potentilla gracilis (slender cinquefoil)	3	0-3	10
Potentilla palustris (purple cinquefoil)	10	0-20	20
Pyrola asarifolia (pink wintergreen)	2	0-3	10
Rorippa palustris (marsh yellowcress)	1	0-1	5
Rudbeckia occidentalis (black head)	30	0-30	5
Saxifraga arguta (brook saxifrage)	1	0-1	5
Scutellaria galericulata (marsh skullcap)	10	0-10	5
Senecio eremophilus (dryland ragwort)	10	0-10	5
Senecio integerrimus (western groundsel)	1	0-1	5
Senecio pseudaureus (streambank groundsel)	4	0-10	15
Senecio sphaerocephalus (mountain-marsh butterweed)	1	0-1	5
Senecio triangularis (arrowleaf groundsel)	1	0-1	25
Sium suave (hemlock water-parsnip)	1	0-1	5
Smilacina stellata (starry Solomon-plume)	4	0-10	15
Solidago canadensis (Canada goldenrod)	20	0-20	5
Stellaria longifolia (longleaved starwort)	1	0-1	5
Stellaria longipes (longstalk starwort)	1	0-1	5
Stellaria umbellata (umbellate starwort)	10	0-10	5
Taraxacum officinale (common dandelion)	10	0-20	20
Thalictrum occidentale (western meadowrue)	5	0-10	15
Trifolium repens (white clover)	9	0-30	20
Typha latifolia (common cattail)	1	0-1	5
Urtica dioica (stinging nettle)	4	0-10	15
Valeriana occidentalis (western valerian)	1	0-1	5
Veronica americana (American speedwell)	5	0-10	15
Vicia americana (American vetch)	1	0-1	5
Viola species (violet)	4	0-10	20
Viola palustris (marsh violet)	1	0-1	5
Ferns and Allies			
Botrychium virginianum (Virginia grape-fern)	1	0-1	5
Dryopteris spinulosa (spinulose wood-fern)	10	0-10	5
Equisetum arvense (field horsetail)	6	0-20	50
Equisetum fluviatile (water horsetail)	10	0-10	5
Equisetum hyemale (common scouring-rush)	6	0-10	10

Heavy cutting of the willows by beaver may lead to dominance by the graminoids. If beaver leave the area because of the lack of food, or are removed by trapping, major storm events or seasonal runoff can cause the dams to be washed out. With the elimination of beaver, the dams will not be repaired, resulting in downcutting and eventually, a lowering of the water table. The lowering of the water table can result in the changing of the site's potential. If the water table equilibrates at a new but lower (drier) state, the site's potential changes to the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type. The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type occupies a slightly drier position on the landscape than that of the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type (Hansen and others 1995).

SOILS

The *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type occurs over a range of soil types, including Entisols, Histosols, and Mollisols (Hansen and others 1995). Some sites are primarily sandy/sandy loam soils underlain by gravels, cobbles, and various larger sized rocks. Slightly elevated zones above the active floodplain can have 2.5 to 5 cm (1 to 2 in) of litter/duff. In regions characterized by fines and silts, organic horizons, often with a high component of root/fibrous plant material, reach 45 cm (18 in) or more below the surface. When saturated, these soils typically take on a muck-like consistency. Fine and coarse sands often compose the underlying layers with a moderate gravel element. A shallow litter and duff layer will develop where flood disturbance is infrequent. This habitat type tends to occupy moist sites with water tables generally near (60 cm [24 in]), if not at, the soil surface. Mottled and gleyed soils, the result of oxidation/reduction reactions, are common due to shallow water tables.

ADJACENT COMMUNITIES

Both the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type and the *Salix drummondiana* (Drummond willow) community type, which represents the grazing disclimax for this series, occupy slightly drier locations than the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type. Willows often establishes along riparian corridors with an assortment of other shrub and tree communities, forming a mosaic of mixed vegetation types. Generally, a variety of willow and shrub types, such as *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), *Cornus stolonifera* (red-osier dogwood) and *Prunus virginiana* (common chokecherry), are present with scattered stands of tree-dominated communities represented by *Picea* species (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Populus tremuloides* (quaking aspen). Uplands may be dominated by *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine), or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. Understory production depends on the density of overstory shrubs and the water level. Livestock forage value of *Carex rostrata* (beaked sedge) is variable, depending upon season, previous grazing use, and the extent of the site. *Carex vesicaria* (inflated sedge) appears to be more palatable and may be grazed in mid to late summer, especially as upland vegetation dries. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled.

Marlow (1984) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during rest periods between long growing seasons that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife
Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type potentially forms structurally diverse thickets of 3-4 m (10-13 ft) tall willow, providing cover and food for many wildlife species. Moose and beaver tend to heavily utilize most species of willows (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries
The dense network of roots from the various willows and the rhizomatous *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) are effective in stabilizing streambanks. Immediately adjacent to the stream, the sedge sod may be undercut and sag into the water providing excellent cover for fish. The various species of willows provide valuable overhanging stream cover and shade. The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

Fire
Prescribed burning in the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year before burning is essential. Residual cover burns well in the spring, before the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix drummondiana (Drummond willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Carex rostrata (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) all form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

Recreational Uses and Considerations
Recreational values of this type are primarily connected with the associated high quality fishery. Dense stands limit canoe or raft access, and camping sites are often unsuitable due to moist or wet conditions. Some stands may be so dense as to hinder most forms of recreational

fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). In addition, communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described elsewhere. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix drummondiana Community Type (Drummond Willow Community Type)

SALDRU (SADR)
Number of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Salix drummondiana* (Drummond willow) community type is an incidental type at mid to moderately high elevations in the mountainous regions of eastern Idaho, ranging from 2,060 to 2,273 m (6,800 to 7,500 ft). This community type may occur on level outwash plains of mountain streams, below hillside seeps and springs, or adjacent to beaver-dammed impoundments. The physical site requirements of *Salix drummondiana* (Drummond willow) correspond with those of *Salix lutea* (yellow willow) and of *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these species are distributed along an elevation gradient, with *Salix drummondiana* (Drummond willow) types occupying locations at higher elevations than either the mid-range *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) types or the lower elevational *Salix lutea* (yellow willow) types.

VEGETATION

The *Salix drummondiana* (Drummond willow) community type is a grazing disclimax. Due to frequent or at least periodic grazing or browsing by wildlife and/or livestock, it develops moderately open canopies in comparison to the dense overstories characteristic of the habitat types in the *Salix drummondiana* (Drummond willow) series. The herbaceous component trends toward disturbance-induced species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), and *Cirsium arvense* (Canada thistle) (Table 41). Species compositions and coverages usually provide insights into the types and levels of disturbances found on various sights.

Table 41. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix drummondiana* (Drummond willow) community type (number = 2 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	1	0-1	50
Shrubs			
Betula glandulosa (bog birch)	1	0-1	50
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	50
Salix drummondiana (Drummond willow)	2	1-3	100
Salix exigua (sandbar willow)	1	0-1	50
Salix farriae (Farr's willow)	1	0-1	50
Salix lasiandra (Pacific willow)	1	0-1	50
Graminoids			
Agropyron spicatum (bluebunch wheatgrass)	1	0-1	50
Agrostis stolonifera (redtop)	1	0-1	50
Bromus ciliatus (fringed brome)	1	0-1	50
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	50
Carex aquatilis (water sedge)	1	0-1	50
Carex cusickii (Cusick's sedge)	3	0-3	50
Carex microptera (small-winged sedge)	1	0-1	50
Phleum pratense (common timothy)	3	0-3	50
Poa compressa (Canada bluegrass)	1	0-1	50
Poa pratensis (Kentucky bluegrass)	80	0-80	50
Forbs			
Achillea millefolium (common yarrow)	1	0-1	50
Artemisia lindleyana (riverbank wormwood)	20	0-20	50
Aster conspicuus (showy aster)	1	0-1	50

Table 41 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Barbarea orthoceras (American wintercress)	1	0-1	50
Gaillardia aristata (blanket-flower)	3	0-3	50
Geum macrophyllum (larged-leaved avens)	1	0-1	50
Habenaria dilatata (white orchis)	1	0-1	50
Petasites sagittatus (arrowleaf coltsfoot)	1	0-1	50
Potentilla anserina (common silverweed)	1	0-1	50
Potentilla gracilis (slender cinquefoil)	1	0-1	50
Prunella vulgaris (self-heal)	1	0-1	50
Stellaria longipes (longstalk starwort)	1	0-1	50
Taraxacum ceratophorum (horned dandelion)	1	0-1	50
Viola species (violet)	1	0-1	50
Ferns and Allies			
Equisetum palustre (marsh horsetail)	1	0-1	50

SUCCESSIONAL INFORMATION

The *Salix drummondiana* (Drummond willow) community type represents an early/mid-seral grazing disclimax of the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type or the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type. However, if physical site alterations cause the riparian zone to become moderately drier, coniferous or deciduous tree dominated communities, notably *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), and *Populus tremuloides* (quaking aspen), may represent the new climax vegetation. Similarly, where sites become inundated for longer periods due to beaver dams or other impoundments, sedges-dominated communities will prevail as willows die off.

SOILS

The *Salix drummondiana* (Drummond willow) community type occurs over a range of soil types, including Entisols, Histosols, and Mollisols (Hansen and others 1995). Some sites are primarily sandy soils underlain by gravels, cobbles, and various larger sized rocks. Slightly elevated zones above the active floodplain may have 2.5 to 5 cm (1 to 2 in) of litter/duff. In regions characterized by fines and silts, organic horizons often reach 45 cm (18 in) or more below the surface. Root/fibrous plant material is common in these zones, which, when saturated, take on a muck-like consistency. Fine and coarse sands often compose the underlying layers with a moderate gravel element. A shallow litter and duff layer can develop where flood disturbance is infrequent. This community type tends to occupy moist sites with water tables generally near (60 cm [24 in]) if not at the soil surface. Mottled and gleyed soils, the result of oxidation/reduction reactions, are present on sites with shallow water tables.

ADJACENT COMMUNITIES

Adjacent sites that are slightly wetter may support either the *Salix drummondiana/Carex rostrata* (Drummond willow/beaked sedge) habitat type or the *Salix drummondiana/Calamagrostis canadensis* (Drummond willow/bluejoint reedgrass) habitat type. Willows often establish along riparian corridors, forming a mosaic of mixed vegetation types with an assortment of other shrub and tree communities. Generally, a variety of willow and shrub types, such as *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), *Cornus stolonifera* (red-osier dogwood) and *Prunus virginiana* (common chokecherry), are present with scattered stands of tree-dominated communities represented by *Picea* (spruce), *Pseudotsuga menziesii* (Douglas fir), and *Populus tremuloides* (quaking aspen). Uplands are dominated by *Pseudotsuga menziesii* (Douglas fir), *Abies lasiocarpa* (subalpine fir), *Pinus contorta* (lodgepole pine), or mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this type are often open, allowing for easy livestock access. Forage productivity is also high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during rest periods between long growing seasons that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). Big game use of *Salix drummondiana* (Drummond willow) shoots, especially during the winter, may be heavy. The linear nature of many of these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to heavily utilize most species of willows (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks (Hansen and others 1995).

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982). After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Soils and streambanks are subject to trampling damage, particularly if fine textured and wet. Grazing should be deferred until sites are drier to reduce trampling and compaction problems (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

Salix drummondiana (Drummond willow) is valuable for revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cut stems of *Salix drummondiana* (Drummond willow) produce an abundance of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

These areas are frequently flooded, requiring additional consideration when planning roads or campsites. However, due to the open structure of the overstory canopy, sites may provide access for anglers and boating enthusiasts (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate “type(s)” that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated to temporarily flooded.

OTHER STUDIES

The *Salix drummondiana* (Drummond willow) community type has been documented in the Classification and Management of Montana's Riparian and Wetland Sites (Hansen and others 1995). Other communities containing high constancies and coverages of *Salix drummondiana* (Drummond willow) have been described. These include the *Salix boothii* (Booth willow) dominated communities described by Padgett and others (1989) for Utah and southeastern Idaho, the *Salix geyeriana* (Geyer willow) dominated communities types described by Hansen and others (1989) for Montana, and the *Salix boothii* (Booth willow) dominated communities described by Youngblood and others (1985b) for eastern Idaho and western Wyoming.

Salix exigua Community Type
(Sandbar Willow Community Type)

SALEXI (SAEX)
Number of Stands Sampled = 44

LOCATION AND ASSOCIATED LANDFORMS

The *Salix exigua* (sandbar willow) community type is a major type associated with rivers and streams in valleys and foothills throughout southcentral and eastern Idaho. Sites range in elevation from 1,091 to 1,818 m (3,600 to 6,000 ft). This community type may develop as narrow swaths along floodplains in U- and V-shaped canyons, and as isolated clusters in wet depressions on grassy benches. On more extensive riverine systems, *Salix exigua* (sandbar willow) colonizes islands and alluvial bars prone to periodic flooding.

VEGETATION

Salix exigua (sandbar willow) may form extremely dense stands, essentially excluding other shrub species, or, where disturbance occurs, may develop more open, scattered communities with greater shrub diversity. Subordinate shrubs, when present, consist of rose, *Cornus stolonifera* (red-osier dogwood), or *Ribes* (currants and gooseberries). The herbaceous segment is extremely diverse and quite dense, regardless of the growth form of the overstory *Salix exigua* (sandbar willow). Pioneer and weedy species are prevalent on sites subject to regular disturbance regimes. Dominant graminoids are represented by *Agrostis stolonifera* (redtop), *Agropyron repens* (quackgrass), and *Poa pratensis* (Kentucky bluegrass) while the forb element may be comprised of species of aster, *Glycyrrhiza lepidota* (American licorice), *Cirsium arvense* (Canada thistle), *Mentha arvensis* (field mint), and *Equisetum* species (horsetail) (Table 42). Moss may also be present where sufficient moisture is available.

Table 42. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix exigua* (sandbar willow) community type (number = 44 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Rosa woodsii (woods rose)	19	0-60	45
Salix exigua (sandbar willow)	63	1-98	100
Graminoids			
Agrostis stolonifera (redtop)	26	0-80	45
Phalaris arundinacea (reed canarygrass)	16	0-50	30
Poa pratensis (Kentucky bluegrass)	9	0-40	36
Forbs			
Cirsium arvense (Canada thistle)	8	0-40	59
Mentha arvensis (field mint)	6	0-20	34
Urtica dioica (stinging nettle)	6	0-40	27

SUCCESSIONAL INFORMATION

Salix exigua (sandbar willow) is a pioneer species, which colonizes barren, alluvial deposits on floodplains, islands, and river bars. It thrives under conditions of frequent, and sometimes prolonged, flooding. *Salix exigua* (sandbar willow) may germinate with *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood), and may dominate newly deposited sediments for the first few seasons. However, as cottonwoods overtake the willows to dominate the site, the shade intolerant *Salix exigua* (sandbar willow) will eventually decline. Where cottonwoods are not present, other willow species, particularly *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), or *Salix drummondiana* (Drummond willow), or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type, may become the climax vegetation. *Salix exigua* (sandbar willow) communities promote bank building and soil development, preparing inhospitable sites for later successional stages.

SOILS

Padgett and others (1989) indicate that soils of this type are classified as Entisols, Inceptisols, Mollisols, or even Histosols. Soil textures range over a broad spectrum from silty clays to sandy loams. Nutrient rich surface horizons may extend to a depth of 90 cm (36 in) on some sites, while other sites may be characterized solely by mineral deposits such as fine or coarse sands. Underlying layers are comprised of sands, gravels, cobbles or various sized rocks. Fluctuating subsurface water tables foster conditions suitable for oxidation/reduction reactions resulting in mottled and gleyed soil characteristics in the upper horizons. Water tables are generally at or near the surface, but may occur at depths of 120 cm (48 in) or more. Surface soils are expected to be moist throughout most of the year. A litter/debris layer may constitute significant ground cover on less disturbed sites with sparse understory components.

ADJACENT COMMUNITIES

Because *Salix exigua* (sandbar willow) is capable of germinating on sites characterized by a broad range of substrates, it is often encountered with a variety of other vegetation communities. *Eleocharis* species (spikesedge) and *Phalaris arundinacea* (reed canarygrass) tend to occupy adjacent inundated and/or saturated sites. Neighboring riparian shrub communities, typically mid-seral stages, associated with the *Salix exigua* (sandbar willow) community type include: *Crataegus douglasii* (black hawthorn), *Betula occidentalis* (water birch), *Ribes* (currants and gooseberries), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), *Salix lutea* (yellow willow), *Salix bebbiana* (Bebb willow), and *Salix boothii* (Booth willow) types. Tree-dominated types, represented by *Pseudotsuga menziesii* (Douglas fir), *Populus tremuloides* (quaking aspen), *Acer negundo* (box-elder), *Populus trichocarpa* (black cottonwood), and *Populus angustifolia* (narrowleaf cottonwood), may be present as well. Uplands are often dominated by *Artemisia tridentata* (big sagebrush) steppe or *Juniperus scopulorum* (Rocky Mountain juniper)/grassland communities.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Although the dense formation of *Salix exigua* (sandbar willow) communities suggests that forage production is low to occasionally moderate (Hansen and others 1995), the dense undergrowth accompanying all stands surveyed in Idaho indicate that forage value may be high, both from the willow and herbaceous components.

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site. However, release from heavy grazing pressure will allow it to reestablish itself, provided it has not been totally removed from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during rest periods between long growing seasons that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Stands of this community type provide excellent thermal and hiding cover for many species of wildlife. *Salix exigua* (sandbar willow) is normally not as heavily browsed as other willow species. However, beaver tends to heavily utilize *Salix exigua* (sandbar willow) (Hansen and others 1995).

Fisheries

Although *Salix exigua* (sandbar willow) typically provides only a limited amount of overhanging shade due to its upright growth form, it may function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion and provide cover in the form of overhanging banks. Although not a source of large woody debris, *Salix exigua* (sandbar willow) may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Sedges and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows (Hansen and others 1995).

Fire

The use of fire in this type as an improvement technique has been little studied. However, the limited available information indicates this type tends to sprout vigorously following fire. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Soil compaction is usually not a problem on coarse textured substrates. Fine textured soils are subject to compaction when moist. Unlike most other willows, *Salix exigua* (sandbar willow) can send up individual stems from a complex underground root system, making it an excellent woody species for stabilizing streambanks. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix exigua (sandbar willow) is a pioneering species commonly located along irrigation ditches, cutbanks, and wet areas adjacent to roads. It has an excellent capability to rapidly colonize and spread on disturbed areas, making it useful in streambank stabilization and revegetation projects at low to mid elevations. Once *Salix exigua* (sandbar willow) has stabilized soils, other shrub and herbaceous species become established. Because of this characteristic, it would be wise for farmers, ranchers, and other land managers to maintain these stands. Once degradation occurs, rapid erosion of the streambank can occur with devastating results (Hansen and others 1995).

Salix exigua (sandbar willow) is highly adapted to most forms of disturbance. It is a prolific sprouter and will reestablish itself following release from heavy grazing pressure; provided it has not been totally removed from the site (Hansen and others 1995).

Revegetating degraded sites or exposed sand/gravel bars are feasible using *Salix exigua* (sandbar willow). Cuttings should be rooted and grown in a nursery to insure survival. *Salix exigua* (sandbar willow) produces an abundance of roots along the entire stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Salix exigua (sandbar willow) often forms dense, impenetrable stands, prohibiting access to streambanks in some locations for anglers. This type offers little shade for campers as it is only a medium sized shrub, and may be subject to intense mosquito infestation (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Similar *Salix exigua* (sandbar willow) community types have been described by Hansen and others (1995; Montana), Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Tuhy and Jensen (1982; central Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), Chadde and others (1988; northern Yellowstone National Park), and Szaro (1989; Arizona and New Mexico). Undergrowth composition between these assorted types varied widely, but was often composed of introduced grasses such as *Agrostis stolonifera* (redtop), *Poa palustris* (fowl bluegrass), and *Poa pratensis* (Kentucky bluegrass).

Salix geyeriana/Calamagrostis canadensis Habitat Type (Geyer Willow/Bluejoint Reedgrass Habitat Type)

SALGEY/CALCAN (SAGE2/CACA4)
Number of Stands Sampled = 29

NOTE: The *Salix geyeriana* (Geyer willow) habitat type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type is an incidental type throughout mountains and valleys of Idaho, ranging in elevation from 1,576 to 2,182 m (5,200 to 7,200 ft). This type prospers on broad, level floodplains of riverine systems, or may be found in narrow bands on alluvial terraces along streams in U-shaped canyons. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type may colonize grassy sites associated with seeps and springs, or dominate the periphery of beaver ponds, but wetter sites tend to be dominated by the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. Types in the *Salix geyeriana* (Geyer willow) series occupy intermediate elevations on the landscape, between higher elevational types in the *Salix drummondiana* (Drummond willow) series and lower elevational types of the *Salix lutea* (yellow willow) series.

VEGETATION

Salix geyeriana (Geyer willow) and *Salix boothii* (Booth willow) typically dominate the overstory shrub layer of this habitat type; however, both species may not be present on all sites. As noted earlier, these two willows occupy similar positions on the landscape with similar environmental conditions and are combined into one series for the purposes of this classification. Understory species compositions reflect the types and levels of disturbance at each site, but herbaceous layers are customarily dominated by *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and/or *Deschampsia cespitosa* (tufted hairgrass). A variety of forbs are present, including *Geum macrophyllum* (large leaved avens), aster, *Smilacina stellata* (starry Solomon-plume), and *Fragaria virginiana* (Virginia strawberry) (Table 43).

Table 43. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (number = 3 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Shrubs			
Lonicera utahensis (Utah honeysuckle)	20	0-20	33
Potentilla fruticosa (shrubby cinquefoil)	10	0-10	33
Ribes species (currant; gooseberry)	6	0-10	67
Salix boothii (Booth willow)	2	0-3	67
Salix drummondiana (Drummond willow)	3	0-3	33
Salix geyeriana (Geyer willow)	70	60-80	100
Salix wolfii (Wolf's willow)	3	0-3	33
Graminoids			
Agrostis scabra (tickle-grass)	1	0-1	33
Agrostis stolonifera (redtop)	3	0-3	33
Calamagrostis canadensis (bluejoint reedgrass)	40	0-60	67
Calamagrostis stricta (narrow-spiked reedgrass)	20	0-20	33
Carex rostrata (beaked sedge)	3	0-3	33
Carex vesicaria (inflated sedge)	1	0-1	33
Forbs			
Arnica chamissonis (meadow arnica)	3	0-3	33
Aster foliaceus (leafy aster)	1	0-1	33
Aster occidentalis (western aster)	1	0-1	33
Cirsium arvense (Canada thistle)	10	0-10	33
Epilobium angustifolium (fireweed)	3	0-3	33
Epilobium ciliatum (common willow-herb)	2	0-3	67
Galium trifidum (small bedstraw)	2	0-3	67
Geum macrophyllum (larged-leaved avens)	2	1-3	100
Ligusticum tenuifolium (slender-leafed licorice-root)	1	0-1	33
Pyrola asarifolia (pink wintergreen)	2	0-3	67
Ranunculus repens (creeping buttercup)	1	0-1	33
Senecio integerrimus (western groundsel)	1	0-1	33
Smilacina stellata (starry Solomon-plume)	1	0-1	33
Viola species (violet)	10	0-10	33

SUCCESSIONAL INFORMATION

Grazing pressure by livestock will cause a decrease in the more desirable grasses such as *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass), with a corresponding increase in either introduced or less desirable species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), or *Juncus balticus* (Baltic rush). If grazing pressures are severe enough, the site takes on the appearance of the grazing disclimax *Salix geyeriana* (Geyer willow) community type (Hansen and others 1995) (Table 44).

Table 44. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix geyeriana/ Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (number = 26 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	3	0-3	2
Picea species (spruce)	2	0-3	15
Pinus contorta (lodgepole pine)	4	0-10	5
Populus tremuloides (quaking aspen)	2	0-3	5
Pseudotsuga menziesii (Douglas fir)	1	0-1	2
Shrubs			
Alnus incana (mountain alder)	6	0-10	11
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	2
Artemisia tridentata (big sagebrush)	1	0-1	2
Betula glandulosa (bog birch)	17	0-40	13
Betula occidentalis (water birch)	10	0-10	2
Cornus stolonifera (red-osier dogwood)	4	0-10	5
Juniperus communis (common juniper)	1	0-1	5
Linnaea borealis (twinflower)	1	0-1	2
Lonicera involucrata (twin-berry)	3	0-3	7
Lonicera utahensis (Utah honeysuckle)	5	0-10	5
Potentilla fruticosa (shrubby cinquefoil)	10	0-40	31
Prunus virginiana (common chokecherry)	1	0-1	2
Ribes species (currant; gooseberry)	3	0-10	24
Ribes hudsonianum (stinking currant)	5	0-10	5
Ribes lacustre (swamp currant)	14	0-30	5
Ribes odoratum (buffalo currant)	3	0-3	2
Ribes setosum (Missouri gooseberry)	2	0-3	7
Rosa species (rose)	1	0-1	4
Rosa woodsii (woods rose)	4	0-20	13
Rubus idaeus (red raspberry)	1	0-1	2
Salix bebbiana (Bebb willow)	19	0-60	22
Salix boothii (Booth willow)	23	0-70	62
Salix brachycarpa (short-fruited willow)	10	0-10	4
Salix candida (hoary willow)	1	0-1	2
Salix commutata (undergreen willow)	10	0-10	2
Salix drummondiana (Drummond willow)	12	0-40	22
Salix exigua (sandbar willow)	7	0-10	5
Salix farriae (Farr's willow)	1	0-1	4
Salix geyeriana (Geyer willow)	26	0-80	75
Salix lutea (yellow willow)	21	0-40	4
Salix planifolia (planeleaf willow)	14	0-40	24
Salix pseudomonticola (mountain willow)	5	0-10	5

Table 44 (cont.)

Species	% Can. Cov.		Con.
	Avg.	Rng.	
Salix wolfii (Wolf's willow)	19	0-70	25
Shepherdia canadensis (Canada buffaloberry)	1	0-1	2
Vaccinium scoparium (whortleberry)	10	0-10	2
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	5
Agrostis exarata (spike bentgrass)	7	0-10	4
Agrostis idahoensis (Idaho bentgrass)	1	0-1	2
Agropyron species (wheatgrass)	1	0-1	2
Agrostis scabra (tickle-grass)	8	0-30	20
Agrostis stolonifera (redtop)	7	0-20	24
Alopecurus aequalis (short-awn foxtail)	7	0-10	5
Alopecurus alpinus (alpine foxtail)	10	0-30	11
Beckmannia syzigachne (American sloughgrass)	1	0-1	2
Bromus carinatus (mountain brome)	1	0-1	2
Bromus ciliatus (fringed brome)	3	0-20	22
Bromus inermis (smooth brome)	80	0-80	2
Calamagrostis canadensis (bluejoint reedgrass)	12	0-50	24
Calamagrostis stricta (narrow-spiked reedgrass)	7	0-20	15
Carex aquatilis (water sedge)	20	0-60	38
Carex atherodes (awned sedge)	1	0-1	2
Carex athrostachya (slender-beaked sedge)	3	0-3	2
Carex aurea (golden sedge)	1	0-1	2
Carex canescens (gray sedge)	10	0-20	5
Carex disperma (soft-leaved sedge)	13	0-20	7
Carex interior (inland sedge)	1	0-1	2
Carex lanuginosa (woolly sedge)	8	0-30	16
Carex lasiocarpa (slender sedge)	3	0-3	2
Carex limosa (mud sedge)	1	0-1	2
Carex microptera (small-winged sedge)	4	0-20	22
Carex multicostata (many-ribbed sedge)	1	0-1	2
Carex nebrascensis (Nebraska sedge)	10	0-10	2
Carex pachystachya (thick-headed sedge)	2	0-3	5
Carex praegracilis (clustered field sedge)	20	0-20	4
Carex rostrata (beaked sedge)	36	0-80	84
Carex simulata (short-beaked sedge)	2	0-3	4
Carex stipata (sawbeak sedge)	3	0-3	2
Carex vesicaria (inflated sedge)	24	0-40	9
Danthonia intermedia (timber oatgrass)	1	0-1	2
Deschampsia cespitosa (tufted hairgrass)	8	0-20	33
Eleocharis palustris (common spikesedge)	2	0-3	4
Elymus cinereus (basin wildrye)	1	0-1	2
Glyceria borealis (northern mannagrass)	1	0-1	4
Glyceria grandis (American mannagrass)	13	0-40	9
Glyceria striata (fowl mannagrass)	5	0-20	15
Grass	1	0-1	2
Hordeum brachyantherum (meadow barley)	1	0-1	5
Hordeum jubatum (foxtail barley)	1	0-1	2
Juncus balticus (Baltic rush)	10	0-40	42
Juncus bufonius (toad rush)	1	0-1	2
Juncus ensifolius (dagger-leaf rush)	2	0-3	5
Juncus longistylis (long-styled rush)	1	0-1	2
Juncus tenuis (slender rush)	1	0-1	2
Luzula campestris (field woodrush)	16	0-30	4
Luzula parviflora (small-flowered woodrush)	1	0-1	2
Muhlenbergia filiformis (slender muhly)	40	0-40	2
Muhlenbergia species (muhly)	1	0-1	2
Phalaris arundinacea (reed canarygrass)	1	0-1	2
Phleum alpinum (alpine timothy)	6	0-10	4
Phleum pratense (common timothy)	4	0-20	24
Poa cusickii (Cusick's bluegrass)	1	0-1	2
Poa palustris (fowl bluegrass)	13	0-80	49
Poa pratensis (Kentucky bluegrass)	8	0-60	55
Poa trivialis (roughstalk bluegrass)	3	0-3	2
Scirpus microcarpus (small-flowered bulrush)	3	0-3	2
Scirpus pallidus (pale bulrush)	3	0-3	2
Scirpus species (bulrush)	1	0-1	2
Trisetum wolfii (Wolf's trisetum)	12	0-30	7
Forbs			
Achillea millefolium (common yarrow)	5	0-20	13
Actaea rubra (baneberry)	1	0-1	2
Allium species (onion)	1	0-1	4
Anaphalis margaritacea (common pearly-everlasting)	1	0-1	2
Angelica arguta (sharptooth angelica)	2	0-3	15
Angelica pinnata (pinnate-leaved angelica)	1	0-1	2
Antennaria anaphaloides (tall pussy-toes)	2	0-3	5
Antennaria corymbosa (meadow pussy-toes)	50	0-50	2
Antennaria microphylla (rosy pussy-toes)	1	0-1	2

Table 44 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Antennaria umbrinella (umber pussy-toes)	20	0-20	2
Aquilegia formosa (sitka columbine)	3	0-3	2
Arenaria macrophylla (bigleaf sandwort)	1	0-1	2
Arnica chamissonis (meadow arnica)	4	0-10	7
Artemisia dracunculus (tarragon)	1	0-1	2
Artemisia ludoviciana (prairie sagewort)	3	0-3	2
Aster chilensis (long-leaved aster)	10	0-40	9
Aster eatonii (Eaton's aster)	4	0-10	7
Aster species (aster)	12	0-30	5
Aster foliaceus (leafy aster)	8	0-20	13
Aster laevis (smooth aster)	3	0-3	2
Aster modestus (few-flowered aster)	1	0-1	7
Aster occidentalis (western aster)	6	0-20	42
Cardamine species (bittercress)	1	0-1	2
Cardamine pensylvanica (Pennsylvania bittercress)	1	0-1	2
Castilleja miniata (scarlet paintbrush)	4	0-10	7
Cerastium species (chickweed)	1	0-1	4
Cerastium vulgatum (common chickweed)	3	0-3	2
Chrysanthemum leucanthemum (oxeye-daisy)	50	0-50	2
Cicuta maculata (spotted water-hemlock)	10	0-10	2
Cirsium arvense (Canada thistle)	6	0-20	22
Cirsium scariosum (elk thistle)	3	0-10	7
Delphinium species (larkspur)	1	0-1	2
Dodecatheon pulchellum (few-flowered shooting star)	2	0-3	4
Draba species (draba)	1	0-1	2
Epilobium angustifolium (fireweed)	1	0-1	18
Epilobium ciliatum (common willow-herb)	4	0-20	49
Epilobium glaberrimum (smooth willow-herb)	1	0-1	4
Epilobium palustre (swamp willow-herb)	1	0-1	2
Erysimum cheiranthoides (wormseed wallflower)	1	0-1	2
Erysimum species (wallflower)	1	0-1	2
Forb	10	0-10	2
Fragaria virginiana (Virginia strawberry)	6	0-30	25
Galium boreale (northern bedstraw)	2	0-10	13
Galium trifidum (small bedstraw)	9	0-20	16
Galium triflorum (sweetscented bedstraw)	1	0-3	11
Gentiana affinis (pleated gentian)	1	0-1	4
Gentianella detonsa (smaller fringed gentian)	1	0-1	4

Table 44 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Geranium species (geranium; crane's-bill)	3	0-3	2
Geranium richardsonii (white geranium)	2	0-3	9
Geranium viscosissimum (sticky geranium)	3	0-3	7
Geum macrophyllum (larged-leaved avens)	4	0-20	64
Geum rivale (water avens)	2	0-3	9
Habenaria species (bog-orchid; Rein-orchid)	1	0-1	2
Heracleum lanatum (cow-parsnip)	7	0-20	9
Hypericum perforatum (common St. John's-wort)	10	0-10	2
Lactuca serriola (prickly lettuce)	1	0-1	2
Lactuca species (lettuce)	1	0-1	2
Ligusticum tenuifolium (slender-leafed licorice-root)	10	0-10	2
Lupinus argenteus (silvery lupine)	1	0-1	2
Mentha arvensis (field mint)	6	0-20	22
Mentha species (mint)	3	0-3	2
Mertensia ciliata (mountain bluebell)	1	0-3	9
Mimulus guttatus (common monkey-flower)	3	0-10	7
Mitella stauropetala (side-flowered mitrewort)	10	0-10	2
Osmorhiza chilensis (mountain sweet-cicely)	20	0-20	2
Pedicularis groenlandica (elephant's head)	3	0-10	13
Pedicularis species (lousewort)	1	0-1	4
Penstemon procerus (small-flowered penstemon)	1	0-1	2
Penstemon species (penstemon)	1	0-1	2
Perideridia gairdneri (Gairdner's yampah)	1	0-1	2
Petasites sagittatus (arrowleaf coltsfoot)	20	0-20	4
Polygonum amphibium (water smartweed)	1	0-1	4
Polygonum aviculare (prostrate knotweed)	3	0-3	2
Polemonium occidentale (western polemonium)	11	0-30	9
Polemonium pulcherrimum (skunk-leaved polemonium)	20	0-20	2
Potamogeton species (pondweed)	3	0-3	2
Potamogeton diversifolius (diverse-leaved pondweed)	1	0-1	2
Potentilla diversifolia (diverse-leaved cinquefoil)	11	0-20	4
Potentilla species (cinquefoil)	1	0-1	2
Potentilla gracilis (slender cinquefoil)	4	0-10	13

Table 44 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Potentilla norvegica (Norwegian cinquefoil)	1	0-1	2
Pyrola asarifolia (pink wintergreen)	1	0-1	7
Ranunculus flammula (creeping buttercup)	1	0-1	2
Ranunculus natans (floating water-buttercup)	3	0-3	4
Rorippa palustris (marsh yellowcress)	2	0-3	4
Rudbeckia occidentalis (black head)	7	0-10	4
Rumex crispus (curly dock)	3	0-10	9
Rumex species (dock; sorrel)	11	0-20	4
Rumex occidentalis (western dock)	1	0-1	2
Saxifraga arguta (brook saxifrage)	1	0-1	2
Saxifraga oregana (Oregon saxifrage)	2	0-3	4
Scutellaria galericulata (marsh skullcap)	1	0-1	4
Senecio hydrophilus (alkali-marsh butterweed)	4	0-10	7
Senecio integerrimus (western groundsel)	6	0-20	11
Senecio pseudaureus (streambank groundsel)	3	0-10	11
Senecio serra (tall butterweed)	1	0-1	2
Senecio sphaerocephalus (mountain-marsh butterweed)	16	0-30	4
Senecio triangularis (arrowleaf groundsel)	1	0-1	4
Silene species (campion; catchfly)	1	0-1	2
Smilacina stellata (starry Solomon-plume)	8	0-20	13
Solidago canadensis (Canada goldenrod)	7	0-20	15
Solidago gigantea (late goldenrod)	1	0-1	2
Stellaria americana (American starwort)	1	0-1	2
Stellaria species (starwort; chickweed)	10	0-10	2
Stellaria longipes (longstalk starwort)	4	0-20	13
Swertia perennis (swertia)	1	0-1	2
Taraxacum officinale (common dandelion)	2	0-10	31
Thalictrum fendleri (Fendler's meadowrue)	1	0-1	5
Thalictrum species (meadowrue)	1	0-1	2
Thalictrum occidentale (western meadowrue)	10	0-10	2
Trifolium hybridum (alsike clover)	1	0-1	2
Trifolium longipes (long-stalked clover)	3	0-10	7
Trifolium repens (white clover)	6	0-20	15
Typha latifolia (common cattail)	3	0-3	2
Urtica dioica (stinging nettle)	4	0-10	7
Valeriana dioica (northern valerian)	1	0-1	2
Valeriana edulis (edible valerian)	1	0-1	4
Veronica americana (American speedwell)	6	0-20	16
Veratrum californicum (California false hellebore)	3	0-3	2
Veronica catenata (chain speedwell)	1	0-1	2
Veronica wormskjoldii (Wormskjold speedwell)	10	0-10	2
Viola species (violet)	8	0-60	16
Viola macloskeyi (small white violet)	10	0-10	2
Viola nephrophylla (northern bog violet)	1	0-1	2
Zizia aptera (heart-leaved Alexanders)	1	0-1	2
Ferns and Allies			
Equisetum arvense (field horsetail)	14	0-70	20
Equisetum hyemale (common scouring-rush)	1	0-1	2
Equisetum species (horsetail; scouring-rush)	1	0-1	2
Equisetum laevigatum (smooth scouring-rush)	2	0-3	9
Equisetum variegatum (variegated horsetail)	1	0-1	2

SOILS

Youngblood and others (1985b) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types, generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Organic surface horizons reach depths over 75 cm (30 in) on some locations, and may contain a moderate fibrous root/plant material component. Soil textures are categorized as fines, generally silts and clays. Deeper alluvial mineral deposits are comprised of fine and coarse sands, gravels, and cobbles. Water tables are probably found near the surface for most of the growing season, within a depth of 1 m (39 in). Mottled and gleyed soil characteristics may be present where water tables occur just below the surface.

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Eleocharis* species (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type occurs on moderately saturated sites while the *Salix geyeriana* (Geyer willow) community type borders drier or disturbed areas. Due to differences in moisture, substrate composition, flooding frequency, and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana /Calamagrostis canadensis* (Geyer willow/ bluejoint reedgrass) habitat type may be associated with a variety of other willow communities, *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir), or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Abundant food, cover, and proximity to water provide habitat for numerous wildlife species such as mammals and songbirds. Summer and winter use by elk may be moderate (Gaffney 1941). The linear nature of many of these communities along waterways serve as important corridors for wildlife movement. Moose and beaver tend to utilize most species of willows heavily.

Both *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) are used as browse by wildlife and livestock. However, *Salix geyeriana* (Geyer willow) seems to be less tolerant of repeated browsing than *Salix boothii* (Booth willow). This may account for the reduced canopy cover and occurrence of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Where adjacent to streams, this type effectively stabilizes soils and forms overhanging banks, enhancing fisheries quality. The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

Fire
Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands (Kovalchik 1986 and 1987). Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning favors rhizomatous species such as *Poa pratensis* (Kentucky bluegrass).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities
Wet, fine textured soils are highly susceptible to trampling damage by cattle. Grazing should be deferred until soils are drier to protect streambanks and minimize damage (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank.

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow). Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Fishing opportunities are good in streams associated with this type. Moist soils and streambanks are subject to trampling damage. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Hansen and others (1995) describe a *Salix geyeriana/ Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type for Montana. Similar communities have been identified in Idaho and western Wyoming (Tuhy and Jensen 1982), eastern Idaho and western Wyoming (Youngblood and others 1985b), and Utah and southeastern Idaho (Padgett and others 1989).

Salix geyeriana/Carex rostrata Habitat Type (Geyer Willow/Beaked Sedge Habitat Type)

SALGEY/CARROS (SAGE2/CARO6)
Number of Stands Sampled = 70

Note: The *Salix geyeriana* (Geyer willow) habitat type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana/Carex rostrata* (Geyer willow/ beaked sedge) habitat type is a minor type throughout mountains and valleys of Idaho, ranging in elevation from 1,576 to 2,182 m (5,200 to 7,200 ft). This habitat type occupies broad, level floodplains of riverine systems, or may be found in narrow bands along smaller streams in open, U-shaped canyons. It occupies wetter sites than *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type, and may colonize wet meadows associated with seeps and springs, or dominate the margins of beaver ponds. Types in the *Salix geyeriana* (Geyer willow) series occupy intermediate elevations on the landscape, between higher elevational communities dominated by *Salix drummondiana* (Drummond willow) and lower elevational communities dominated by *Salix lutea* (yellow willow).

VEGETATION

Salix geyeriana (Geyer willow) and *Salix boothii* (Booth willow) typically dominate the overstory shrub layer of this habitat type; however, both species may not be present on all sites. As indicated earlier, these two willows occupy similar positions on the landscape with similar environmental conditions and are combined in this habitat type for the purposes of this classification. Other shrub species, which assume only a subordinate role in this type, include *Alnus incana* (mountain alder), *Salix exigua* (sandbar willow), and *Salix drummondiana* (Drummond willow). The understory is dominated by *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), and/or *Carex aquatilis* (water sedge). A variety of forb species may be found in this habitat type, such as *Aster eatonii* (Eaton's aster), *Mentha arvensis* (field mint), and *Equisetum arvense* (field horsetail) (Table 45). Understory species variations often reflect the types and levels of disturbance present on site.

Table 45. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (number = 15 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus tremuloides (quaking aspen)	1	0-1	7
Shrubs			
Betula glandulosa (bog birch)	10	0-10	7
Lonicera involucrata (twin-berry)	1	0-1	7
Lonicera utahensis (Utah honeysuckle)	4	0-10	27
Potentilla fruticosa (shrubby cinquefoil)	8	0-20	27
Rhamnus alnifolia (alder buckthorn)	30	0-30	7
Ribes species (currant; gooseberry)	8	0-20	20
Ribes lacustre (swamp currant)	2	0-3	13
Ribes setosum (Missouri gooseberry)	1	0-1	7
Salix boothii (Booth willow)	45	0-98	67
Salix brachycarpa (short-fruited willow)	1	0-1	7
Salix drummondiana (Drummond willow)	16	0-30	27
Salix exigua (sandbar willow)	7	0-10	13
Salix geyeriana (Geyer willow)	48	0-80	80
Salix planifolia (planeleaf willow)	30	0-30	7
Salix wolfii (Wolf's willow)	20	0-20	7
Graminoids			
Agrostis scabra (tickle-grass)	11	0-20	27
Agrostis stolonifera (redtop)	30	0-30	7
Alopecurus aequalis (short-awn foxtail)	3	0-3	7
Alopecurus alpinus (alpine foxtail)	3	0-3	7
Bromus ciliatus (fringed brome)	1	0-1	13
Calamagrostis canadensis (bluejoint reedgrass)	15	0-20	27
Carex aquatilis (water sedge)	24	0-60	60
Carex atherodes (awned sedge)	40	0-40	7
Carex canescens (gray sedge)	10	0-10	7
Carex concinnoides (northwestern sedge)	3	0-3	7
Carex disperma (soft-leaved sedge)	15	0-20	13
Carex interior (inland sedge)	1	0-1	13
Carex lanuginosa (woolly sedge)	2	0-3	13
Carex pachystachya (thick-headed sedge)	1	0-1	7
Carex rostrata (beaked sedge)	36	0-80	93
Carex vesicaria (inflated sedge)	10	0-10	7
Deschampsia cespitosa (tufted hairgrass)	20	0-20	7
Glyceria grandis (American mannagrass)	3	0-3	7
Glyceria striata (fowl mannagrass)	12	0-20	13
Poa palustris (fowl bluegrass)	3	0-10	27
Poa pratensis (Kentucky bluegrass)	1	0-1	7
Scirpus microcarpus (small-flowered bulrush)	10	0-10	7
Trisetum wolfii (Wolf's trisetum)	10	0-10	7
Forbs			
Arnica chamissonis (meadow arnica)	1	0-1	7
Aster eatonii (Eaton's aster)	10	0-10	7
Aster foliaceus (leafy aster)	1	0-1	7
Aster occidentalis (western aster)	8	0-10	20
Cirsium arvense (Canada thistle)	1	0-1	7
Cirsium scariosum (elk thistle)	10	0-10	7
Epilobium angustifolium (fireweed)	1	0-1	7
Epilobium ciliatum (common willow-herb)	6	0-20	40
Epilobium palustre (swamp willow-herb)	3	0-3	7
Erigeron species (daisy; fleabane)	3	0-3	7
Galium trifidum (small bedstraw)	10	0-10	20
Galium triflorum (sweetscented bedstraw)	2	0-3	20
Geum macrophyllum (larged-leaved avens)	7	0-20	53
Lemna minor (water lentil)	20	0-20	7
Ligusticum tenuifolium (slender-leafed licorice-root)	15	0-20	13
Mentha arvensis (field mint)	2	0-3	33
Pedicularis groenlandica (elephant's head)	1	0-1	7
Plantago major (common plantain)	1	0-1	7
Polemonium occidentale (western polemonium)	2	0-3	13
Potentilla palustris (purple cinquefoil)	30	0-30	7
Pyrola asarifolia (pink wintergreen)	7	0-10	13
Ranunculus macounii (Macoun's buttercup)	3	0-3	7

Table 45 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Rorippa palustris (marsh yellowcress)	1	0-1	7
Rumex crispus (curly dock)	1	0-1	7
Scutellaria galericulata (marsh skullcap)	1	0-1	7
Senecio integerrimus (western groundsel)	11	0-20	13
Senecio pseudaureus (streambank groundsel)	2	0-3	13
Smilacina stellata (starry Solomon-plume)	5	0-10	20
Solidago canadensis (Canada goldenrod)	6	0-10	13
Stellaria longipes (longstalk starwort)	1	0-1	7
Thalictrum species (meadowrue)	1	0-1	7
Thalictrum occidentale (western meadowrue)	3	0-3	7
Veronica americana (American speedwell)	3	0-3	13
Vicia americana (American vetch)	3	0-3	7
Viola species (violet)	2	0-3	20
Ferns and Allies			
Equisetum arvense (field horsetail)	20	0-30	13
Equisetum hyemale (common scouring-rush)	10	0-10	7
Equisetum laevigatum (smooth scouring-rush)	20	0-20	7

SUCCESSIONAL INFORMATION

The *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type indicates saturated or wetter conditions. Prolonged, intense utilization by livestock and wild ungulates may shift the site potential to the drier grazing disclimax, the *Salix geyeriana* (Geyer willow) community type. This type is characterized by stands that are more open with an understory dominated by *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), and other disturbance induced species. Beaver may exert a significant influence on the sites as well, especially concerning physical parameters. Active dams raise water tables as impoundments develop, increasing the potential for the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. However, sustained removal of willows by beaver for forage and dam materials reduce the site to a sedge community. When beaver abandon a site, dams eventually deteriorate. Water tables drop as ponds disappear and sites dry out, shifting the site potential to favor the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (Hansen and others 1995) (Table 46).

Table 46. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (number = 55 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	3	0-3	2
Picea species (spruce)	2	0-3	15
Pinus contorta (lodgepole pine)	4	0-10	5
Populus tremuloides (quaking aspen)	2	0-3	5
Pseudotsuga menziesii (Douglas fir)	1	0-1	2
Shrubs			
Alnus incana (mountain alder)	6	0-10	11
Arctostaphylos uva-ursi (kinnikinnick)	1	0-1	2
Artemisia tridentata (big sagebrush)	1	0-1	2
Betula glandulosa (bog birch)	17	0-40	13
Betula occidentalis (water birch)	10	0-10	2
Cornus stolonifera (red-osier dogwood)	4	0-10	5
Juniperus communis (common juniper)	1	0-1	5
Linnaea borealis (twinflower)	1	0-1	2
Lonicera involucrata (twin-berry)	3	0-3	7
Lonicera utahensis (Utah honeysuckle)	5	0-10	5
Potentilla fruticosa (shrubby cinquefoil)	10	0-40	31
Prunus virginiana (common chokecherry)	1	0-1	2
Ribes species (currant; gooseberry)	3	0-10	24
Ribes hudsonianum (stinking currant)	5	0-10	5
Ribes lacustre (swamp currant)	14	0-30	5
Ribes odoratum (buffalo currant)	3	0-3	2
Ribes setosum (Missouri gooseberry)	2	0-3	7
Rosa species (rose)	1	0-1	4
Rosa woodsii (woods rose)	4	0-20	13
Rubus idaeus (red raspberry)	1	0-1	2
Salix bebbiana (Bebb willow)	19	0-60	22
Salix boothii (Booth willow)	23	0-70	62
Salix brachycarpa (short-fruited willow)	10	0-10	4
Salix candida (hoary willow)	1	0-1	2
Salix commutata (undergreen willow)	10	0-10	2
Salix drummondiana (Drummond willow)	12	0-40	22
Salix exigua (sandbar willow)	7	0-10	5
Salix farriae (Farr's willow)	1	0-1	4
Salix geyeriana (Geyer willow)	26	0-80	75
Salix lutea (yellow willow)	21	0-40	4
Salix planifolia (planeleaf willow)	14	0-40	24
Salix pseudomonticola (mountain willow)	5	0-10	5

Table 46 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Salix wolfii (Wolf's willow)	19	0-70	25
Shepherdia canadensis (Canada buffaloberry)	1	0-1	2
Vaccinium scoparium (whortleberry)	10	0-10	2
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	5
Agrostis exarata (spike bentgrass)	7	0-10	4
Agrostis idahoensis (Idaho bentgrass)	1	0-1	2
Agropyron species (wheatgrass)	1	0-1	2
Agrostis scabra (tickle-grass)	8	0-30	20
Agrostis stolonifera (redtop)	7	0-20	24
Alopecurus aequalis (short-awn foxtail)	7	0-10	5
Alopecurus alpinus (alpine foxtail)	10	0-30	11
Beckmannia syzigachne (American sloughgrass)	1	0-1	2
Bromus carinatus (mountain brome)	1	0-1	2
Bromus ciliatus (fringed brome)	3	0-20	22
Bromus inermis (smooth brome)	80	0-80	2
Calamagrostis canadensis (bluejoint reedgrass)	12	0-50	24
Calamagrostis stricta (narrow-spiked reedgrass)	7	0-20	15
Carex aquatilis (water sedge)	20	0-60	38
Carex atherodes (awned sedge)	1	0-1	2
Carex athrostachya (slender-beaked sedge)	3	0-3	2
Carex aurea (golden sedge)	1	0-1	2
Carex canescens (gray sedge)	10	0-20	5
Carex disperma (soft-leaved sedge)	13	0-20	7
Carex interior (inland sedge)	1	0-1	2
Carex lanuginosa (woolly sedge)	8	0-30	16
Carex lasiocarpa (slender sedge)	3	0-3	2
Carex limosa (mud sedge)	1	0-1	2
Carex microptera (small-winged sedge)	4	0-20	22
Carex multicostata (many-ribbed sedge)	1	0-1	2
Carex nebrascensis (Nebraska sedge)	10	0-10	2
Carex pachystachya (thick-headed sedge)	2	0-3	5
Carex praegracilis (clustered field sedge)	20	0-20	4
Carex rostrata (beaked sedge)	36	0-80	84
Carex simulata (short-beaked sedge)	2	0-3	4
Carex stipata (sawbeak sedge)	3	0-3	2
Carex vesicaria (inflated sedge)	24	0-40	9
Danthonia intermedia (timber oatgrass)	1	0-1	2
Deschampsia cespitosa (tufted hairgrass)	8	0-20	33

Table 46 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Eleocharis palustris (common spikesedge)	2	0-3	4
Elymus cinereus (basin wildrye)	1	0-1	2
Glyceria borealis (northern mannagrass)	1	0-1	4
Glyceria grandis (American mannagrass)	13	0-40	9
Glyceria striata (fowl mannagrass)	5	0-20	15
Grass	1	0-1	2
Hordeum brachyantherum (meadow barley)	1	0-1	5
Hordeum jubatum (foxtail barley)	1	0-1	2
Juncus balticus (Baltic rush)	10	0-40	42
Juncus bufonius (toad rush)	1	0-1	2
Juncus ensifolius (dagger-leaf rush)	2	0-3	5
Juncus longistylis (long-styled rush)	1	0-1	2
Juncus tenuis (slender rush)	1	0-1	2
Luzula campestris (field woodrush)	16	0-30	4
Luzula parviflora (small-flowered woodrush)	1	0-1	2
Muhlenbergia filiformis (slender muhly)	40	0-40	2
Muhlenbergia species (muhly)	1	0-1	2
Phalaris arundinacea (reed canarygrass)	1	0-1	2
Phleum alpinum (alpine timothy)	6	0-10	4
Phleum pratense (common timothy)	4	0-20	24
Poa cusickii (Cusick's bluegrass)	1	0-1	2
Poa palustris (fowl bluegrass)	13	0-80	49
Poa pratensis (Kentucky bluegrass)	8	0-60	55
Poa trivialis (roughstalk bluegrass)	3	0-3	2
Scirpus microcarpus (small-flowered bulrush)	3	0-3	2
Scirpus pallidus (pale bulrush)	3	0-3	2
Scirpus species (bulrush)	1	0-1	2
Trisetum wolfii (Wolf's trisetum)	12	0-30	7
Forbs			
Achillea millefolium (common yarrow)	5	0-20	13
Actaea rubra (baneberry)	1	0-1	2
Allium species (onion)	1	0-1	4
Anaphalis margaritacea (common pearly-everlasting)	1	0-1	2
Angelica arguta (sharptooth angelica)	2	0-3	15
Angelica pinnata (pinnate-leaved angelica)	1	0-1	2
Antennaria anaphaloides (tall pussy-toes)	2	0-3	5
Antennaria corymbosa (meadow pussy-toes)	50	0-50	2
Antennaria microphylla (rosy pussy-toes)	1	0-1	2
Antennaria umbrinella (umber pussy-toes)	20	0-20	2

Table 46 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Aquilegia formosa (sitka columbine)	3	0-3	2
Arenaria macrophylla (bigleaf sandwort)	1	0-1	2
Arnica chamissonis (meadow arnica)	4	0-10	7
Artemisia dracunculus (tarragon)	1	0-1	2
Artemisia ludoviciana (prairie sagewort)	3	0-3	2
Aster chilensis (long-leaved aster)	10	0-40	9
Aster eatonii (Eaton's aster)	4	0-10	7
Aster species (aster)	12	0-30	5
Aster foliaceus (leafy aster)	8	0-20	13
Aster laevis (smooth aster)	3	0-3	2
Aster modestus (few-flowered aster)	1	0-1	7
Aster occidentalis (western aster)	6	0-20	42
Cardamine species (bittercress)	1	0-1	2
Cardamine pensylvanica (Pennsylvania bittercress)	1	0-1	2
Castilleja miniata (scarlet paintbrush)	4	0-10	7
Cerastium species (chickweed)	1	0-1	4
Cerastium vulgatum (common chickweed)	3	0-3	2
Chrysanthemum leucanthemum (oxeye-daisy)	50	0-50	2
Cicuta maculata (spotted water-hemlock)	10	0-10	2
Cirsium arvense (Canada thistle)	6	0-20	22
Cirsium scariosum (elk thistle)	3	0-10	7
Delphinium species (larkspur)	1	0-1	2
Dodecatheon pulchellum (few-flowered shooting star)	2	0-3	4
Draba species (draba)	1	0-1	2
Epilobium angustifolium (fireweed)	1	0-1	18
Epilobium ciliatum (common willow-herb)	4	0-20	49
Epilobium glaberrimum (smooth willow-herb)	1	0-1	4
Epilobium palustre (swamp willow-herb)	1	0-1	2
Erysimum cheiranthoides (wormseed wallflower)	1	0-1	2
Erysimum species (wallflower)	1	0-1	2
Forb	10	0-10	2
Fragaria virginiana (Virginia strawberry)	6	0-30	25
Galium boreale (northern bedstraw)	2	0-10	13
Galium trifidum (small bedstraw)	9	0-20	16
Galium triflorum (sweetscented bedstraw)	1	0-3	11
Gentiana affinis (pleated gentian)	1	0-1	4
Gentianella detonsa (smaller fringed gentian)	1	0-1	4
Geranium species (geranium; crane's-bill)	3	0-3	2
Geranium richardsonii (white geranium)	2	0-3	9
Geranium viscosissimum (sticky geranium)	3	0-3	7
Geum macrophyllum (larged-leaved avens)	4	0-20	64
Geum rivale (water avens)	2	0-3	9
Habenaria species (bog-orchid; Rein-orchid)	1	0-1	2
Heracleum lanatum (cow-parsnip)	7	0-20	9
Hypericum perforatum (common St. John's-wort)	10	0-10	2
Lactuca serriola (prickly lettuce)	1	0-1	2
Lactuca species (lettuce)	1	0-1	2
Ligusticum tenuifolium (slender-leafed licorice-root)	10	0-10	2
Lupinus argenteus (silvery lupine)	1	0-1	2
Mentha arvensis (field mint)	6	0-20	22
Mentha species (mint)	3	0-3	2
Mertensia ciliata (mountain bluebell)	1	0-3	9
Mimulus guttatus (common monkey-flower)	3	0-10	7
Mitella stauropetala (side-flowered mitrewort)	10	0-10	2
Osmorhiza chilensis (mountain sweet-cicely)	20	0-20	2
Pedicularis groenlandica (elephant's head)	3	0-10	13
Pedicularis species (lousewort)	1	0-1	4
Penstemon procerus (small-flowered penstemon)	1	0-1	2
Penstemon species (penstemon)	1	0-1	2
Perideridia gairdneri (Gairdner's yampah)	1	0-1	2
Petasites sagittatus (arrowleaf coltsfoot)	20	0-20	4
Polygonum amphibium (water smartweed)	1	0-1	4
Polygonum aviculare (prostrate knotweed)	3	0-3	2
Polemonium occidentale (western polemonium)	11	0-30	9
Polemonium pulcherrimum (skunk-leaved polemonium)	20	0-20	2
Potamogeton species (pondweed)	3	0-3	2
Potamogeton diversifolius (diverse-leaved pondweed)	1	0-1	2
Potentilla diversifolia (diverse-leaved cinquefoil)	11	0-20	4
Potentilla species (cinquefoil)	1	0-1	2
Potentilla gracilis (slender cinquefoil)	4	0-10	13
Potentilla norvegica (Norwegian cinquefoil)	1	0-1	2
Pyrola asarifolia (pink wintergreen)	1	0-1	7

Table 46 (cont.)

Species	% Can. Cov. Avg.	 Rng.	Con.
Ranunculus flammula (creeping buttercup)	1	0-1	2
Ranunculus natans (floating water-buttercup)	3	0-3	4
Rorippa palustris (marsh yellowcress)	2	0-3	4
Rudbeckia occidentalis (black head)	7	0-10	4
Rumex crispus (curly dock)	3	0-10	9
Rumex species (dock; sorrel)	11	0-20	4
Rumex occidentalis (western dock)	1	0-1	2
Saxifraga arguta (brook saxifrage)	1	0-1	2
Saxifraga oregana (Oregon saxifrage)	2	0-3	4
Scutellaria galericulata (marsh skullcap)	1	0-1	4
Senecio hydrophilus (alkali-marsh butterweed)	4	0-10	7
Senecio integerrimus (western groundsel)	6	0-20	11
Senecio pseudaureus (streambank groundsel)	3	0-10	11
Senecio serra (tall butterweed)	1	0-1	2
Senecio sphaerocephalus (mountain-marsh butterweed)	16	0-30	4
Senecio triangularis (arrowleaf groundsel)	1	0-1	4
Silene species (campion; catchfly)	1	0-1	2
Smilacina stellata (starry Solomon-plume)	8	0-20	13
Solidago canadensis (Canada goldenrod)	7	0-20	15
Solidago gigantea (late goldenrod)	1	0-1	2
Stellaria americana (American starwort)	1	0-1	2
Stellaria species (starwort; chickweed)	10	0-10	2
Stellaria longipes (longstalk starwort)	4	0-20	13
Swertia perennis (swertia)	1	0-1	2
Taraxacum officinale (common dandelion)	2	0-10	31
Thalictrum fendleri (Fendler's meadowrue)	1	0-1	5
Thalictrum species (meadowrue)	1	0-1	2
Thalictrum occidentale (western meadowrue)	10	0-10	2
Trifolium hybridum (alsike clover)	1	0-1	2
Trifolium longipes (long-stalked clover)	3	0-10	7
Trifolium repens (white clover)	6	0-20	15
Typha latifolia (common cattail)	3	0-3	2
Urtica dioica (stinging nettle)	4	0-10	7
Valeriana dioica (northern valerian)	1	0-1	2
Valeriana edulis (edible valerian)	1	0-1	4
Veronica americana (American speedwell)	6	0-20	16
Veratrum californicum (California false hellebore)	3	0-3	2
Veronica catenata (chain speedwell)	1	0-1	2
Veronica wormskjoldii (Wormskjold speedwell)	10	0-10	2
Viola species (violet)	8	0-60	16
Viola macloskeyi (small white violet)	10	0-10	2
Viola nephrophylla (northern bog violet)	1	0-1	2
Zizia aptera (heart-leaved Alexanders)	1	0-1	2
Ferns and Allies			
Equisetum arvense (field horsetail)	14	0-70	20
Equisetum hyemale (common scouring-rush)	1	0-1	2
Equisetum species (horsetail; scouring-rush)	1	0-1	2
Equisetum laevigatum (smooth scouring-rush)	2	0-3	9
Equisetum variegatum (variegated horsetail)	1	0-1	2

SOILS

Youngblood and others (1985b) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types, generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Organic surface horizons reach depths over 75 cm (30 in) on some locations, and may contain a moderate fibrous root/plant material component. Soil textures are categorized as fines, generally silts and clays. Deeper alluvial mineral deposits are comprised of coarse and fine sands, gravels, and cobbles. Water tables are probably found near the surface for most of the growing season, within a depth of 1 m (39 in). Mottled and gleyed soil characteristics may be present where water tables occur just below the surface.

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Eleocharis* species (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana* (Geyer willow) community type may occupy adjacent drier sites, depending on the level of disturbance. Due to differences in moisture, substrate composition, flooding frequency, and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana/*

Carex rostrata (Geyer willow/beaked sedge) habitat type may be associated with a variety of other willow communities, or *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir), or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland species are cured, or stock distribution is poor. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled with duration of treatments limited to less than 30 days and frequency of this treatment to about one year in three or four (Myers 1989).

Marlow (1984) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during rest periods between long growing seasons that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

A diversity of wildlife species, ranging from large mammals to rodents and songbirds, use this type for food, cover, and nesting (Dittberner and Olson 1983). Moose and beaver have been observed to use willows extensively in places.

Both *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) are used as browse by wildlife and livestock. However, *Salix geyeriana* (Geyer willow) seems to be less tolerant of repeated browsing than *Salix boothii* (Booth willow). This may account for the reduced canopy cover and occurrence of *Salix geyeriana* (Geyer willow) in select stands of the *Salix geyeriana* (Geyer willow) dominated types (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Willow communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Sedges and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows, and strengthening overhanging banks. As a source of food and building material, willows attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags.

Fire
Prescribed burning in the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tend to result in fewer sprouts (Hansen and others 1995).

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year before burning is essential. Residual cover burns well in the spring, before the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
The wet nature of these fine soils makes them highly susceptible to damage by livestock and heavy machinery. These disturbances often lead to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted, and then grown in a nursery to insure survival. *Salix geyeriana* (Geyer willow) cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow) cuttings. Cut stems of these willows produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Carex rostrata (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge) all form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995).

Recreational Uses and Considerations
This habitat type is commonly adjacent to fisheries and streamside trails may develop. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995). Elevated mosquito populations may discourage campers from using these sites.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate “type(s)” that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar communities, codominated by *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow), have been described by a number of researchers: Hansen and others (1995; Montana), Norton and others (1981; Greys River, Wyoming), Mutz and Queiroz (1983; southeastern Idaho), Youngblood and others (1985b; eastern Idaho and western Wyoming), Chadde and others (1988; Yellowstone National Park), and Padgett and others (1989; Utah).

Salix geyeriana Community Type
(Geyer Willow Community Type)

SALGEY (SAGE2)
Number of Stands Sampled = 58

NOTE: The *Salix geyeriana* (Geyer willow) community type includes all combinations of *Salix geyeriana* (Geyer willow) and *Salix boothii* (Booth willow) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Salix geyeriana* (Geyer willow) community type is a major type throughout mountains and valleys of Idaho, ranging in elevation from 1,576 to 2,182 m (5,200 to 7,200 ft). This community type prospers on broad, level floodplains of riverine systems and in narrow bands along smaller streams in open, U-shaped canyons. It may colonize grassy alpine sites associated with seeps and springs, or dominate the periphery of beaver ponds. The *Salix geyeriana* (Geyer willow) community type represents a disturbance type of the *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type. *Salix geyeriana* (Geyer willow) communities occupy intermediate elevations on the landscape, between higher elevational *Salix drummondiana* (Drummond willow) communities and lower elevational *Salix lutea* (yellow willow) communities.

VEGETATION

The *Salix geyeriana* (Geyer willow) community type may contain a variety of shrub species, particularly *Ribes* (currants and gooseberries) and *Rosa woodsii* (woods rose), in addition to the dominant *Salix boothii* (Booth willow) and/or *Salix geyeriana* (Geyer willow). Due to wildlife and livestock utilization, this grazing/browsing disclimax tends to develop stands that are more open. Numerous, diverse graminoids and forbs, such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Geum macrophyllum* (larged-leaved avens), aster, and *Cirsium arvense* (Canada thistle), may be present (Table 47). The levels and types of disturbances typically account for the species composition and variability.

Table 47. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Salix geyeriana* (Geyer willow) community type (number = 58 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	7	0-30	31
Ribes species (currant; gooseberry)	3	0-20	31
Rosa woodsii (woods rose)	10	0-40	28
Salix bebbiana (Bebb willow)	20	0-70	33
Salix boothii (Booth willow)	29	0-80	93
Salix geyeriana (Geyer willow)	31	0-80	53
Graminoids			
Agrostis stolonifera (redtop)	14	0-80	40
Bromus ciliatus (fringed brome)	4	0-30	28
Juncus balticus (Baltic rush)	8	0-20	38
Phleum pratense (common timothy)	7	0-40	50
Poa palustris (fowl bluegrass)	11	0-80	47
Poa pratensis (Kentucky bluegrass)	18	0-80	69
Forbs			
Achillea millefolium (common yarrow)	3	0-20	47
Aster occidentalis (western aster)	5	0-20	38
Cirsium arvense (Canada thistle)	7	0-40	43
Epilobium ciliatum (common willow-herb)	4	0-20	29
Fragaria virginiana (Virginia strawberry)	9	0-40	41
Geum macrophyllum (larged-leaved avens)	4	0-20	64
Mentha arvensis (field mint)	3	0-20	28
Potentilla gracilis (slender cinquefoil)	3	0-20	26
Smilacina stellata (starry Solomon-plume)	5	0-30	50
Solidago canadensis (Canada goldenrod)	5	0-20	34
Taraxacum officinale (common dandelion)	3	0-20	52
Urtica dioica (stinging nettle)	12	0-80	33
Ferns and Allies			
Equisetum arvense (field horsetail)	5	0-30	28

SUCCESSIONAL INFORMATION

The *Salix geyeriana* (Geyer willow) community type represents the driest of the communities dominated by *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow). Prolonged, intense utilization by livestock and wild ungulates can shift site potentials from the wet *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type, or the moist *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type (Hansen and others 1995). Continued grazing pressures may eliminate the willow component, resulting in sedge-dominated communities on saturated sites, or *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass) or other disturbance -induced communities on drier locations.

SOILS

Youngblood and others (1985b) indicate that *Salix boothii* (Booth willow) and *Salix geyeriana* (Geyer willow) dominated communities may occur over a range of soil types, generally classified as Mollisols and Histosols, or, where less soil development has occurred, Inceptisols and Entisols. Organic surface horizons reach depths over 75 cm (30 in) on some locations, and may contain a moderate fibrous root/plant material component. Soil textures are categorized as fines, generally silts and clays. Deeper alluvial mineral deposits are comprised of fine and coarse sands, gravels, and cobbles. Water tables may are found near the surface for most of the growing season, within depths of 1 m (39 in). Mottled and gleyed soil characteristics may be present where water tables occur just below the surface.

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Eleocharis* species (spikesedge), and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. The *Salix geyeriana/Calamagrostis canadensis* (Geyer willow/bluejoint reedgrass) habitat type or the *Salix geyeriana/Carex rostrata* (Geyer willow/beaked sedge) habitat type may occupy adjacent less disturbed sites. Due to differences in moisture, substrate composition, flooding frequency, and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. The *Salix geyeriana* (Geyer willow) community type may be associated with a variety of other willow communities, or *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), or *Populus tremuloides* (quaking aspen) types. Uplands are dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus contorta* (lodgepole pine), and *Abies lasiocarpa* (subalpine fir) or by *Artemisia tridentata* (big sagebrush) steppe and grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this type are often open, allowing for easy livestock access. Forage productivity is also high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in reduced vigor of willows, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

The species and structural diversity of this type make it a valuable cover and food source for a wide range of wildlife species, including deer, moose, waterfowl, upland game, songbirds, and small mammals (Dittberner and Olson 1983). Moose and beaver have been observed to use willows extensively in places.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Willow communities function in a variety of capacities to promote stream health and enhance fisheries. Willows form dense root networks that stabilize streambanks against lateral cutting and erosion, provide cover in the form of overhanging branches and banks, and shade channels, effectively moderating extreme temperature fluctuations. Although not a source of large woody debris, willows may trap large trees borne downstream, creating deeper pools and additional cover for fish species. As a source of food and building material, willows attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags (Hansen and others 1995).

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands (Kovalchik 1986 and 1987).

Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts.

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982). After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Soils and streambanks are subject to trampling damage, particularly if they are fine textured and wet. Grazing should be deferred until sites are drier to reduce trampling and compaction problems (Marlow 1984). Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site (Hansen and others 1995).

Salix geyeriana (Geyer willow) is valuable in revegetating disturbed streambanks. Cuttings should be first rooted then grown in a nursery to insure survival. Cuttings, however, may be more difficult to root than *Salix boothii* (Booth willow). Cut stems of *Salix geyeriana* (Geyer willow) produce low to moderate numbers of roots, located along the entire length of the stem. Best results are obtained from cuttings taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10-15 days after planting (Hansen and others 1995). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). In eastern Idaho and western Wyoming, Youngblood and others (1985b) identified two similar disturbance-induced community types: the (*Salix geyeriana/Poa palustris* (Geyer willow/fowl bluegrass) community type and the *Salix boothii/Poa palustris* (Booth willow/fowl bluegrass) community type.

Salix lasiandra Community Type
(Pacific Willow Community Type)

SALLAS (SALA5)
Number of Stands Sampled = 21

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lasiandra* (Pacific willow) community type is a minor type at low to mid elevations in southern and eastern Idaho. Sites range from 1,394 to 2,000 m (4,600 to 6,600 ft). Stands of this community type may be located in proximity to seeps and low, moist depressional areas, but more frequently, occur as part of a diverse mosaic with other willow species in riparian corridors. *Salix lasiandra* (Pacific willow) appears in U- and V-shaped drainages on narrow swaths of alluvial deposits or establishes as more extensive stands on broader, level, riverine floodplains.

VEGETATION

Salix lasiandra (Pacific willow) exhibits two major growth forms in Idaho: medium, tree-sized shrubs with boles up to 45 cm (18 in) in diameter that reach heights upwards of 7 m (21 ft), or multi-trunk shrubs. Brunsfeld and Johnson (1985) indicate that the single-trunk form is more prevalent at lower elevations while the multi-trunk form predominates at moderately higher elevations. This willow represents one of the taller willows and typically forms extremely dense overhead canopies, often precluding the development of lush understory shrub or herbaceous layers. Stands of the *Salix lasiandra* (Pacific willow) community type may contain trace amounts of a variety of other shrub species, including *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), *Rosa* species (rose), and *Ribes* (currant). The sparse herbaceous component may be composed of *Poa pratensis* (Kentucky bluegrass), *Epilobium ciliatum* (common willow-herb), *Urtica dioica* (stinging nettle), *Mentha arvensis* (field mint), and *Geum macrophyllum* (larged-leaved avens) (Table 48). Local disturbances may cause species compositions to diverge between sites. The ground surface may be littered with woody debris, and patches of moss may occur sporadically where sufficient moisture is available.

Table 48. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Salix lasiandra* (Pacific willow) community type that are relatively undisturbed by livestock or wildlife (number = 3 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Artemisia cana (silver sagebrush)	1	0-1	33
Salix lasiandra (Pacific willow)	59	20-98	100
Graminoids			
Agropyron cristatum (crested wheatgrass)	1	0-1	33
Calamagrostis canadensis (bluejoint reedgrass)	3	0-3	33
Carex aquatilis (water sedge)	3	0-3	33
Carex species (sedges)	1	0-1	33
Carex rostrata (beaked sedge)	3	0-3	33
Carex vesicaria (inflated sedge)	3	0-3	33
Deschampsia cespitosa (tufted hairgrass)	3	0-3	33
Eleocharis palustris (common spikesedge)	3	0-3	33
Phalaris arundinacea (reed canarygrass)	60	0-60	33
Poa palustris (fowl bluegrass)	20	0-20	33
Forbs			
Geum macrophyllum (larged-leaved avens)	1	0-1	33
Melilotus alba (white sweet-clover)	1	0-1	33
Mentha arvensis (field mint)	22	0-40	67
Sium suave (hemlock water-parsnip)	3	0-3	33
Thermopsis montana (Mountain Thermopsis)	3	0-3	33
Trifolium pratense (red clover)	1	0-1	33
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	33

SUCCESSIONAL INFORMATION

Brunsfeld and Johnson (1985) indicate that at lower elevations where *Salix lasiandra* (Pacific willow) forms a medium sized, tree-like shrub, it is common in open *Populus trichocarpa* (black cottonwood) forests, or as a fringe around dense cottonwood stands. *Salix lasiandra* (Pacific willow) appears to be an early to mid-seral species and may favor environmental site conditions similar to those of cottonwoods and *Salix exigua* (sandbar willow). In Montana, many stands seem to represent an early seral stage of the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type (Hansen and others (1995). *Salix geyeriana* (Geyer willow) and *Salix lutea* (yellow willow) are often associated with *Salix lasiandra* (Pacific willow) and might represent climax types in some areas (Table 49).

Table 49. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix lasiandra* (Pacific willow) community type (number = 18 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus angustifolia (narrowleaf cottonwood)	1	0-1	6
Populus trichocarpa (black cottonwood)	1	0-1	6
Salix amygdaloides (peach-leaf willow)	20	0-20	6
Shrubs			
Alnus incana (mountain alder)	1	0-1	11
Artemisia cana (silver sagebrush)	4	0-10	17
Chrysothamnus nauseosus (common rabbitbrush)	1	0-1	6
Cornus stolonifera (red-osier dogwood)	21	0-40	22
Crataegus douglasii (black hawthorn)	6	0-10	11
Prunus virginiana (common chokecherry)	20	0-20	6
Ribes species (currant; gooseberry)	1	0-1	6
Ribes lacustre (swamp currant)	5	0-10	17
Ribes odoratum (buffalo currant)	4	0-10	28
Ribes viscosissimum (sticky currant)	1	0-1	6
Rosa woodsii (woods rose)	11	0-40	50
Salix exigua (sandbar willow)	1	0-1	6
Salix geyeriana (Geyer willow)	3	0-3	6
Salix lasiandra (Pacific willow)	71	1-98	100
Salix lutea (yellow willow)	3	0-3	22
Solanum dulcamara (climbing nightshade)	11	0-20	11
Symphoricarpos occidentalis (western snowberry)	11	0-20	11
Symphoricarpos oreophilus (mountain snowberry)	1	0-1	6
Toxicodendron rydbergii (poison ivy)	1	0-1	6
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	11
Agropyron cristatum (crested wheatgrass)	20	0-20	6

Table 49 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Agrostis exarata (spike bentgrass)	7	0-10	11
Agropyron repens (quackgrass)	31	0-60	11
Agropyron smithii (western wheatgrass)	13	0-20	28
Agrostis stolonifera (redtop)	14	0-20	28
Alopecurus aequalis (short-awn foxtail)	1	0-1	11
Bromus carinatus (mountain brome)	1	0-1	6
Bromus commutatus (hairy brome)	3	0-3	6
Bromus inermis (smooth brome)	60	0-60	6
Bromus japonicus (Japanese brome)	1	0-1	6
Bromus tectorum (cheatgrass)	1	0-1	6
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	6
Carex aquatilis (water sedge)	3	0-3	6
Carex lanuginosa (woolly sedge)	7	0-10	17
Carex microptera (small-winged sedge)	1	0-1	6
Carex rostrata (beaked sedge)	1	0-1	6
Carex vesicaria (inflated sedge)	1	0-1	6
Elymus glaucus (blue wildrye)	1	0-1	11
Glyceria elata (tall mannagrass)	1	0-1	6
Glyceria grandis (American mannagrass)	1	0-1	11
Glyceria striata (fowl mannagrass)	1	0-1	6
Hordeum jubatum (foxtail barley)	10	0-10	11
Juncus articulatus (jointed rush)	1	0-1	6
Juncus balticus (Baltic rush)	10	0-10	6
Juncus ensifolius (dagger-leaf rush)	3	0-3	6
Muhlenbergia asperifolia (alkali muhly)	1	0-1	6
Phalaris arundinacea (reed canarygrass)	80	0-80	6
Phleum pratense (common timothy)	2	0-3	11
Poa palustris (fowl bluegrass)	2	0-3	11
Poa pratensis (Kentucky bluegrass)	27	0-90	39
Puccinellia pauciflora (weak alkaligrass)	1	0-1	6
Scirpus microcarpus (small-flowered bulrush)	3	0-3	6
Stipa comata (needle-and-thread)	20	0-30	17
Stipa occidentalis (western needlegrass)	1	0-1	6
Forbs			
Achillea millefolium (common yarrow)	2	0-3	22
Actaea rubra (baneberry)	3	0-3	6
Arctium minus (common burdock)	3	0-3	6
Arenaria species (sandwort)	1	0-1	6
Artemisia ludoviciana (prairie sagewort)	2	0-3	17
Aster occidentalis (western aster)	2	0-3	11
Bidens vulgata (tall beggar-ticks)	10	0-10	6
Cardamine breweri (Brewer's bittercress)	1	0-1	6
Cicuta maculata (spotted water-hemlock)	2	0-3	11
Cirsium arvense (Canada thistle)	1	0-1	33
Cynoglossum officinale (common hound's-tongue)	20	0-20	6
Descurainia sophia (flixweed tansymustard)	1	0-1	6
Epilobium ciliatum (common willow-herb)	4	0-10	44
Epilobium palustre (swamp willow-herb)	1	0-1	6
Forb	6	0-10	11
Galium aparine (goose-grass)	10	0-10	6
Galium triflorum (sweetscented bedstraw)	1	0-1	6
Geranium viscosissimum (sticky geranium)	1	0-1	6
Geum macrophyllum (larged-leaved avens)	2	0-3	39
Glycyrrhiza lepidota (American licorice)	13	0-30	22
Hackelia floribunda (showy stickseed)	2	0-3	17
Heracleum lanatum (cow-parsnip)	30	0-30	6
Lactuca serriola (prickly lettuce)	1	0-1	6
Linaria vulgaris (butter-and-eggs)	3	0-3	6
Lycopus americanus (cut-leaved water horehound)	10	0-10	11
Mentha arvensis (field mint)	3	0-10	28
Mimulus guttatus (common monkey-flower)	2	0-3	17
Montia chamissoi (water montia)	1	0-1	6
Nasturtium officinale (water-cress)	2	0-3	11
Nepeta cataria (catnip)	2	0-3	11
Osmorhiza occidentalis (western sweet-cicely)	1	0-1	6
Plantago major (common plantain)	3	0-3	6
Polygonum amphibium (water smartweed)	3	0-3	6
Potentilla biennis (biennial cinquefoil)	1	0-1	6
Rumex crispus (curly dock)	11	0-30	17
Scutellaria galericulata (marsh skullcap)	2	0-3	11
Senecio serra (tall butterweed)	7	0-10	11
Sium suave (hemlock water-parsnip)	3	0-3	6
Smilacina stellata (starry Solomon-plume)	8	0-10	17
Solidago canadensis (Canada goldenrod)	1	0-1	6
Solidago gigantea (late goldenrod)	1	0-1	6

Table 49 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Solidago missouriensis (Missouri goldenrod)	10	0-10	6
Taraxacum officinale (common dandelion)	1	0-1	6
Trifolium hybridum (alsike clover)	1	0-1	6
Trifolium pratense (red clover)	1	0-1	6
Trifolium repens (white clover)	1	0-1	11
Urtica dioica (stinging nettle)	9	0-20	39
Veronica americana (American speedwell)	2	0-3	11
Veronica anagallis-aquatica (water speedwell)	1	0-1	11
Veronica species (speedwell)	1	0-1	6
Viola nephrophylla (northern bog violet)	1	0-1	6
Viola orbiculata (round-leaved violet)	1	0-1	6
Ferns and Allies			
Equisetum arvense (field horsetail)	2	0-3	11
Equisetum species (horsetail; scouring-rush)	1	0-1	6

SOILS

Salix lasiandra (Pacific willow) germinates on a variety of alluvial materials. Soil textures range from silty clay loams to fine sands. Where infrequent disturbance allows its accumulation, a litter/duff layer may be up to 15 cm (6 in) deep and contributes to the high concentration of organic matter often present in the upper surface horizons. Underlying layers composed of coarse grain sands, gravels, and cobbles of assorted sizes, form irregular bands and pockets in an unconsolidated matrix. Soils may be classified as Entisols, Inceptisols, or Mollisols. Water tables are commonly at the surface, but can occur at depths of 60 cm (24 in) or more, and are thought to provide moisture to the upper horizons throughout the growing season. Mottled and gleyed soil characteristics on some sites indicate elevated water tables, which promote oxidation/reduction reactions.

ADJACENT COMMUNITIES

Shrubs typically form mosaic patterns across stream drainages such that individual species tend to dominate particular microsites. *Salix lasiandra* (Pacific willow) is often accompanied by *Salix bebbiana* (Bebb willow), *Salix lutea* (yellow willow), *Salix exigua* (sandbar willow), *Salix geyeriana* (Geyer willow), and/or *Salix boothii* (Booth willow) in riparian zones. Other affiliated shrubs include *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), or *Alnus incana* (mountain alder). Cottonwoods may be present as well on broader floodplains. *Populus tremuloides* (quaking aspen) and *Pseudotsuga menziesii* (Douglas fir) may integrate into these riparian complexes, but also dominate drier, adjacent upland sites. Rangelands dominated by *Artemisia tridentata* (big sagebrush)/grasslands, and sand dunes, border riparian zones occupied by the *Salix lasiandra* (Pacific willow) community type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of the *Salix lasiandra* (Pacific willow) community type typically form narrow, often discontinuous bands of limited extent. Forage productivity is often low due to disturbance by frequent flooding (Hansen and others 1995).

Stands of the *Salix lasiandra* (Pacific willow) community type are typically heavily impacted by livestock. Because of their location, most stands at lower elevations receive season long grazing and are commonly used as a winter feeding ground by ranchers. Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows show a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

The *Salix lasiandra* (Pacific willow) community type provides browse and cover for moose, deer, birds, and small mammals. Beaver tend to utilize most species of willows heavily. It is also provides diversity for other mammals and songbirds (Hansen and others 1995).

Fisheries

Willow communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lasiandra* (Pacific willow) forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme temperature fluctuations. It may be a source of large woody debris or trap large trees borne downstream, creating deeper pools and additional cover for fish. Where the herbaceous layer is dense, it acts to trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material, willows attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags (Hansen and others 1995).

Fire
The response of *Salix lasiandra* (Pacific willow) to fire and its sprouting capabilities are poorly documented (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Coarse textured soils generally do not have compaction problems. However, many stands that are heavily impacted by livestock at present exhibit large amounts of bare ground. These degraded stands are vulnerable to erosion problems during high water periods. Management should emphasize the importance of willows in protecting the streambank. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient streambank protection (Hansen and others 1995).

Use of *Salix lasiandra* (Pacific willow) for stabilizing streambanks is recommended on appropriate sites. It is easily rooted and forms abundant roots on planted cuttings approximately 10 days after planting (Platts and others 1987). However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
The *Salix lasiandra* (Pacific willow) community type may provide access to rivers and streams for recreational fishing. When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that are prone to disturbance. However, the often-open understory and shade offered by *Salix lasiandra* (Pacific willow) provides excellent opportunities for picnicking and primitive camping (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

Salix lutea/Calamagrostis canadensis Habitat Type (Yellow Willow/Bluejoint Reedgrass Habitat Type)

SALLUT/CALCAN (SALU2/CACA4)
Number of Stands Sampled = 5

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type ranges in elevation from 1,333 to 1,818 m (4,400 to 6000 ft), and is an incidental type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or may establish broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be associated with beaver complexes. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow) and *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these three species are distributed across an elevational gradient, with types in the *Salix lutea* (yellow willow) series occupying the lowest elevations, types in the *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) appearing at intermediate ranges and *Salix drummondiana* (Drummond willow) types dominating higher altitudes.

VEGETATION

In Idaho, *Salix lutea* (yellow willow) has two growth forms: it may occur as single-trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the shrub form may be tree-sized themselves, arising from bases up to 1 m (39 in) in diameter before diverging. *Salix lutea* (yellow willow) dominates the upper shrub layer but may be accompanied by subordinate shrubs including other willows, *Cornus stolonifera* (red-osier dogwood), and *Betula* species (water birch). The herbaceous layer is dominated by the signature species *Calamagrostis canadensis* (bluejoint reedgrass), although *Deschampsia cespitosa* (tufted hairgrass) and/or *Calamagrostis stricta* (narrow-spiked reedgrass) may also be well represented. Depending on the extent and nature of disturbance, the composition of other forbs and graminoids varies (Table 50).

Table 50. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of disturbed and/or early to mid-seral stands of the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type (number = 5 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Shrubs			
Betula occidentalis (water birch)	1	0-1	40
Cornus stolonifera (red-osier dogwood)	21	0-40	40
Rosa woodsii (woods rose)	2	0-3	60
Salix bebbiana (Bebb willow)	54	0-80	60
Salix lutea (yellow willow)	11	1-20	100
Graminoids			
Agrostis stolonifera (redtop)	7	0-10	40
Calamagrostis canadensis (bluejoint reedgrass)	30	0-40	40
Deschampsia cespitosa (tufted hairgrass)	5	0-10	60
Festuca rubra (red fescue)	2	0-3	40
Juncus balticus (Baltic rush)	40	0-60	40
Phleum pratense (common timothy)	3	0-3	40
Poa pratensis (Kentucky bluegrass)	40	0-60	40
Forbs			
Allium schoenoprasum (chives)	2	0-3	40
Aster chilensis (long-leaved aster)	3	0-3	40
Geranium species (geranium; crane's-bill)	3	0-3	40
Geum macrophyllum (larged-leaved avens)	1	0-1	40
Mentha arvensis (field mint)	6	0-10	40
Viola species (violet)	6	0-10	40

SUCCESSIONAL INFORMATION

If browsing pressure is heavy, willow coverages will decrease, resulting in communities that are more open. Grazing pressure by livestock will cause a decrease in the more desirable grasses such as *Calamagrostis canadensis* (bluejoint reedgrass), *Calamagrostis stricta* (narrow-spiked reedgrass), and *Deschampsia cespitosa* (tufted hairgrass), with a corresponding increase in either introduced or less desirable species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), or *Juncus balticus* (Baltic rush). If grazing pressures are severe enough, the site takes on the appearance of the grazing induced *Salix lutea* (yellow willow) community type (Hansen and others 1995). Physiological site changes may shift the potential climax vegetation to types in the *Populus tremuloides* (quaking aspen) series or the *Juniperus scopulorum*/*Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type.

SOILS

Brichta (1987) indicates that soils occupied by this habitat type in Idaho may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. These surface layers may be 1 m (39 in) or more deep and are often integrated with high quantities of organic material. Alluvial deposits of sands and fine gravel may form irregular lenses throughout the soil solum on sites located on active or secondary floodplains. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers may occur on sites with infrequent disturbance, and may be 10 cm (4 in) thick.

ADJACENT COMMUNITIES

Sedges, rushes, spikesedges, and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. Under slightly less saturated conditions, the *Salix lutea*/*Carex rostrata* (yellow willow/beaked sedge) habitat type dominates. More disturbed locations may be occupied by the *Salix lutea* (yellow willow) community type. The *Populus tremuloides*/*Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type or the *Populus angustifolia*/*Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occur on drier, upper floodplains. Where *Salix lutea* (yellow willow) is present as part of a mosaic, other willows and a variety of shrubs such as *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), and *Betula occidentalis* (water birch), may be present. Uplands are typically dominated by *Juniperus scopulorum* (Rocky Mountain juniper) shrublands or *Artemisia tridentata* (big sagebrush)/grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is high, and where extensive, this type may be an important source of summer forage. Palatability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) varies from moderate to high, depending upon season and availability of other species (USDA Forest Service 1937). Foliage is most palatable when young, but wet conditions early in the grazing season limits use by livestock, especially sheep. Due to the high forage production and highly palatable grasses, many of these sites have heavy summer and fall use, especially after uplands have been grazed. Sustained grazing decreases the vigor, reproductive success, and competitive ability of *Calamagrostis canadensis* (bluejoint reedgrass) and *Deschampsia cespitosa* (tufted hairgrass) (Volland 1985). Under season long grazing, they may be replaced by *Poa pratensis* (Kentucky bluegrass). To maintain vigor and prevent damage to soils and vegetation, grazing should be deferred until soils dry. Proper levels of grazing should range from light to moderate (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows showed a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941). Dense stands provide excellent thermal and hiding cover for many wildlife species.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

Where adjacent to streams, this type effectively stabilizes soils and forms overhanging banks, enhancing fisheries quality. The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

Fire

Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Calamagrostis canadensis (bluejoint reedgrass) propagates itself by both seeds and rhizomes, making this species an aggressive invader of moist, burned sites (Crane and Fischer 1986). These features also make it a valuable species for stabilizing or rehabilitating mountain streams.

Deschampsia cespitosa (tufted hairgrass) is resistant to damage from fire (DeBenedetti and Parsons 1984). Root crowns are rarely damaged, even by hot, intense fires. However, repeated burning favors rhizomatous species such as *Poa pratensis* (Kentucky bluegrass).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities

Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting. However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Salix lutea (yellow willow) may form dense stands, preventing fishing access to anglers. However, where disturbance is prevalent, stands may become more open and provide greater opportunities for recreational activities When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type in eastern Idaho and western Wyoming. Hansen and others (1995) also document this type for the state of Montana in the *Classification and Management of Montana's Riparian and Wetland Sites.*

Salix lutea/Carex rostrata Habitat Type
(Yellow Willow/Beaked Sedge Habitat Type)

SALLUT/CARROS (SALU2/CARO6)
Number of Stands Sampled =15

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type ranges in elevation from 1,333 to 1,818 m (4,400 to 6000 ft), and is a minor type at low to mid elevations throughout the foothills and valleys of central and eastern Idaho. This type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or may establish broader stands on wide floodplains associated with riverine systems. It may also occupy grassy, upper floodplains with high water tables or be found associated with beaver dams. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow and *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these three species are distributed across an elevational gradient, with types in the *Salix lutea* (yellow willow) series occupying the lowest elevations, types in the *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) appearing at intermediate ranges and *Salix drummondiana* (Drummond willow) types dominating higher altitudes.

VEGETATION

Salix lutea (yellow willow) has two growth forms in Idaho: it may occur as single-trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the shrub form may be tree-sized themselves, arising from bases up to 1 m (39 in) in diameter before diverging. *Salix lutea* (yellow willow) dominates the upper shrub layer, although occasional *Pseudotsuga menziesii* (Douglas fir) or *Populus tremuloides* (quaking aspen) may be present. Subordinate understory shrubs may be represented by other willows, *Ribes* (currant) or *Rosa* species (rose). *Carex rostrata* (beaked sedge), the diagnostic understory species, dominates the herbaceous layer, often with lesser amounts of *Carex vesicaria* (inflated sedge), *Carex aquatilis* (water sedge), or other sedges. A diversity of understory species, such as *Poa pratensis* (Kentucky bluegrass) and *Juncus* species (rush), may be present depending on the intensity and type of disturbance (Table 51).

Table 51. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (number = 4 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Betula glandulosa (bog birch)	1	0-1	25
Lonicera involucrata (twin-berry)	1	0-1	25
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	50
Salix bebbiana (Bebb willow)	3	0-3	25
Salix exigua (sandbar willow)	1	0-1	25
Salix lutea (yellow willow)	43	20-80	100
Graminoids			
Agrostis stolonifera (redtop)	3	0-3	25
Bromus ciliatus (fringed brome)	1	0-1	25
Calamagrostis stricta (narrow-spiked reedgrass)	2	0-3	50
Carex aquatilis (water sedge)	60	0-60	25
Carex lanuginosa (woolly sedge)	3	0-3	25
Carex rostrata (beaked sedge)	65	40-80	100
Carex vesicaria (inflated sedge)	3	0-3	25
Glyceria grandis (American mannagrass)	1	0-1	25
Hordeum brachyantherum (meadow barley)	1	0-1	25
Hordeum jubatum (foxtail barley)	1	0-1	25
Poa palustris (fowl bluegrass)	1	0-1	50
Poa pratensis (Kentucky bluegrass)	3	0-3	25
Forbs			
Aster foliaceus (leafy aster)	1	0-1	25
Cirsium arvense (Canada thistle)	1	0-1	25
Epilobium ciliatum (common willow-herb)	3	0-3	25
Mentha arvensis (field mint)	3	0-3	25

Table 51 (cont.)

Species	% Can. Cov. Avg.	 Rng.	 Con.
Polygonum amphibium (water smartweed)	3	0-3	25
Potentilla gracilis (slender cinquefoil)	1	0-1	25
Rumex salicifolius (willow dock)	1	0-1	25
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	25
Verbascum thapsus (common mullein)	1	0-1	25
Viola species (violet)	3	0-3	25
Ferns and Allies			
Equisetum arvense (field horsetail)	1	0-1	25

SUCCESSIONAL INFORMATION

With prolonged disturbance, herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Equisetum arvense* (field horsetail), and *Juncus balticus* (Baltic rush) tend to increase (Table 52). If browsing is heavy, willow coverages will decrease, resulting in communities that are more open. The site may then become occupied by the *Salix lutea* (yellow willow) community type, which represents a grazing disclimax (Hansen and others 1995). Physiological site changes, as a product of natural or human-related disturbances, may shift the potential climax vegetation to types in the *Populus tremuloides* (quaking aspen) series, or the *Pseudotsuga menziesii*/*Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type.

Table 52. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Salix lutea*/*Carex rostrata* (yellow willow/beaked sedge) habitat type (number = 11 stands)

Species	% Can. Cov. Avg.	 Rng.	 Con.
Shrubs			
Betula glandulosa (bog birch)	18	0-40	36
Betula occidentalis (water birch)	40	0-60	18
Cornus stolonifera (red-osier dogwood)	10	0-40	55
Potentilla fruticosa (shrubby cinquefoil)	9	0-20	45
Ribes species (currant; gooseberry)	1	0-1	9
Ribes setosum (Missouri gooseberry)	1	0-1	9
Rosa woodsii (woods rose)	2	0-3	36
Rubus idaeus (red raspberry)	3	0-3	9
Salix bebbiana (Bebb willow)	23	0-50	55
Salix boothii (Booth willow)	10	0-10	9
Salix brachycarpa (short-fruited willow)	10	0-10	9
Salix candida (hoary willow)	40	0-40	18
Salix geyeriana (Geyer willow)	20	0-20	18
Salix glauca (Glaucous Willow)	30	0-30	9
Salix lutea (yellow willow)	18	10-40	100
Salix planifolia (planeleaf willow)	10	0-30	36
Salix pseudomonticola (mountain willow)	20	0-20	9
Salix serissima (autumn willow)	11	0-20	27
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	18
Agrostis species (bentgrass)	1	0-1	18
Agrostis scabra (tickle-grass)	1	0-1	9
Agrostis stolonifera (redtop)	8	0-20	27
Alopecurus pratensis (meadow foxtail)	10	0-10	9
Bromus ciliatus (fringed brome)	1	0-1	27
Calamagrostis canadensis (bluejoint reedgrass)	20	0-20	9
Calamagrostis stricta (narrow-spiked reedgrass)	8	0-20	27
Carex aquatilis (water sedge)	48	0-80	27
Carex atherodes (awned sedge)	3	0-3	9
Carex aurea (golden sedge)	3	0-3	9
Carex capillaris (hair sedge)	1	0-1	9
Carex diandra (lesser-panicled sedge)	3	0-3	9
Carex interior (inland sedge)	20	0-30	18
Carex lanuginosa (woolly sedge)	20	0-20	9
Carex leptalea (bristle-stalked sedge)	10	0-10	9
Carex nebrascensis (Nebraska sedge)	11	0-20	18
Carex praegracilis (clustered field sedge)	20	0-20	9
Carex rostrata (beaked sedge)	23	0-60	73
Carex simulata (short-beaked sedge)	2	0-3	36
Carex vesicaria (inflated sedge)	70	0-70	9
Deschampsia cespitosa (tufted hairgrass)	7	0-20	45
Eleocharis compressa (flatstem spike-rush)	1	0-1	9
Eriophorum polystachion (many-spiked cotton-grass)	1	0-1	9
Festuca rubra (red fescue)	40	0-40	9
Glyceria grandis (American mannagrass)	1	0-1	9
Holcus lanatus (common velvet-grass)	1	0-1	9
Juncus alpinus (northern rush)	1	0-1	9
Juncus balticus (Baltic rush)	15	0-40	55
Muhlenbergia species (muhly)	1	0-1	9
Phleum pratense (common timothy)	1	0-1	9
Poa palustris (fowl bluegrass)	7	0-10	18

Table 52 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Poa pratensis (Kentucky bluegrass)	1	0-1	9
Forbs			
Achillea millefolium (common yarrow)	1	0-1	9
Angelica arguta (sharptooth angelica)	10	0-10	9
Antennaria anaphaloides (tall pussy-toes)	1	0-1	9
Aster chilensis (long-leaved aster)	3	0-3	9
Aster species (aster)	20	0-20	9
Aster junciformis (rush aster)	1	0-1	9
Aster modestus (few-flowered aster)	10	0-10	9
Aster occidentalis (western aster)	1	0-1	27
Castilleja species (Indian-paintbrush; paintbrush)	3	0-3	9
Cicuta maculata (spotted water-hemlock)	6	0-10	18
Delphinium virescens (prairie larkspur)	1	0-1	9
Epilobium ciliatum (common willow-herb)	1	0-1	27
Fragaria virginiana (Virginia strawberry)	6	0-10	18
Galium aparine (goose-grass)	10	0-10	9
Galium boreale (northern bedstraw)	1	0-1	18
Galium trifidum (small bedstraw)	1	0-1	18
Galium triflorum (sweetscented bedstraw)	40	0-40	9
Gentianella detonsa (smaller fringed gentian)	1	0-1	9
Geranium species (geranium; crane's-bill)	1	0-1	9
Geum macrophyllum (larged-leaved avens)	2	0-3	36
Helianthus nuttallii (Nuttall's sunflower)	1	0-1	9
Heracleum lanatum (cow-parsnip)	10	0-10	9
Lysimachia ciliata (fringed loosestrife)	1	0-1	9
Mentha arvensis (field mint)	1	0-1	27
Mimulus guttatus (common monkey-flower)	20	0-20	9
Parnassia palustris (northern grass-of-parnassus)	1	0-1	18
Petasites sagittatus (arrowleaf coltsfoot)	20	0-20	9
Plantago major (common plantain)	1	0-1	18
Potentilla anserina (common silverweed)	1	0-1	9
Rumex species (dock; sorrel)	1	0-1	9
Senecio triangularis (arrowleaf groundsel)	3	0-3	9
Smilacina stellata (starry Solomon-plume)	1	0-1	18
Solidago canadensis (Canada goldenrod)	8	0-20	27
Solidago gigantea (late goldenrod)	3	0-3	9
Sonchus species (sow-thistle)	1	0-1	9
Swertia perennis (swertia)	1	0-1	9
Taraxacum officinale (common dandelion)	3	0-3	9
Thalictrum fendleri (Fendler's meadowrue)	3	0-3	9
Thalictrum species (meadowrue)	1	0-1	9
Thalictrum occidentale (western meadowrue)	2	0-3	18
Triglochin palustre (marsh arrow-grass)	1	0-1	18
Typha latifolia (common cattail)	1	0-1	18
Urtica dioica (stinging nettle)	1	0-1	9
Valeriana occidentalis (western valerian)	1	0-1	9
Vicia americana (American vetch)	2	0-3	18
Viola adunca (Hook violet)	6	0-10	18
Viola species (violet)	7	0-20	36
Ferns and Allies			
Equisetum arvense (field horsetail)	37	0-80	27

Heavy cutting of willows by beaver may lead to dominance by the graminoids. If beaver leave an area because of the lack of food, or are removed by trapping, major storm events or seasonal runoff can cause the dams to be washed out. With the elimination of beaver, the dams will not be repaired, resulting in downcutting and eventually, a lowering of the water table. The lowering of the water table can result in the changing of the site's potential. If the water table equilibrates at a new but lower (drier) state, the site's potential changes to the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type. The *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type occupies a slightly drier position on the landscape than that of the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (Hansen and others 1995)

SOILS

Brichta (1987) indicates that soils occupied by this habitat type in Idaho may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. These surface layers may be 1 m (39 in) or more deep and are often integrated with high quantities of organic material. Alluvial deposits of sands and fine gravels may form irregular lenses throughout the soil solum on sites located on active or secondary floodplains. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation/reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers may occur on sites with infrequent disturbance, and may be 10 cm (4 in) thick.

ADJACENT COMMUNITIES

Sedges, rushes, spikesedges, and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. Under somewhat drier conditions, the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type dominates. More disturbed sites may be occupied by the *Salix lutea* (yellow willow) community type. The *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type or the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type may occur on drier, upper floodplains. Where *Salix lutea* (yellow willow) is present as part of a mosaic, other willows and a variety of shrubs such as *Cornus stolonifera* (red-osier dogwood), *Alnus incana* (mountain alder), *Prunus virginiana* (common chokecherry), and *Betula occidentalis* (water birch), may be present. Uplands are typically dominated by *Juniperus scopulorum* (Rocky Mountain juniper) shrubland or *Artemisia tridentata* (big sagebrush)/grassland.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage value of *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland species are cured, or stock distribution is poor (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows ed a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

Myers (1989) found that deferred and rest rotation grazing systems generally favor sedge species over willow species since woody species are vulnerable to longer duration treatments and to late summer/fall treatments. Woody species are vulnerable to pruning damage, while sedges are protected by a root reserve. Late summer and fall grazing should be carefully controlled.

Marlow (1995) also feels that fall (October) grazing will have a negative impact on willows due to limited regrowth at the end of the growing season. However, he feels that rest and deferred rotation can have a positive effect on willows when cattle are properly managed. High use by wildlife in the fall can limit the amount of regrowth.

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941). Dense stands provide excellent thermal and hiding cover for many wildlife species.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated. (Hansen and others 1995)

Fisheries

The importance of willows in streambank protection, cover, and thermal protection for fisheries cannot be emphasized enough. The herbaceous understory aids in filtering out sediments during high flows thereby contributing to the overall building of the streambanks. Some stands may be so dense as to hinder most forms of recreational fishing. If fishing access is important, dense stands may be opened by the use of livestock as a management tool (Hansen and others 1995).

Fire
Prescribed burning in the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Burning of this type can temporarily increase productivity of *Carex rostrata* (beaked sedge), *Carex aquatilis* (water sedge), and *Carex vesicaria* (inflated sedge). However, nonuse by livestock during the year before burning is essential. Residual cover burns well in the spring, before the growing season. After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth. Care should be taken when burning stands along streambanks because of the excellent erosion protection provided by the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30 to 50 cm (12 to 20 in) long and greater than 1 cm (0.5 in) in diameter produce the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting. However, nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Salix lutea (yellow willow) may form dense stands, preventing fishing access to anglers. However, where disturbance is prevalent, stands may become more open and provide greater opportunities for recreational activities When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type in eastern Idaho and western Wyoming. Hansen and others (1995) also document this type for the state of Montana in the *Classification and Management of Montana's Riparian and Wetland Sites*.

Salix lutea Community Type
(Yellow Willow Community Type)

SALLUT (SALU2)
Number of Stands Sampled = 26

LOCATION AND ASSOCIATED LANDFORMS

The *Salix lutea* (yellow willow) community type ranges in elevation from 1,333 to 1,818 m (4,400 to 6000 ft), and is a major type at low to mid elevations throughout the foothills and valleys of southcentral and eastern Idaho. This community type may be part of a diverse mosaic of shrub and tree communities occupying riparian corridors along streams in U- and V-shaped canyons, or as broader stands on wide floodplains associated with riverine systems. It can also occupy grassy, upper floodplains with high water tables or be associated with beaver complexes. The habitat requirements of *Salix lutea* (yellow willow) generally correspond with those of *Salix drummondiana* (Drummond willow) and *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow). However, these three species appear to be distributed across an elevational gradient, with the *Salix lutea* (yellow willow) type occupying the lowest elevations, the *Salix geyeriana-Salix boothii* (Geyer willow-Booth willow) types generally appearing at intermediate ranges, and *Salix drummondiana* (Drummond willow) type dominating higher altitudes.

VEGETATION

In Idaho, *Salix lutea* (yellow willow) has two growth forms: it may occur as single-trunked, medium sized trees, or as multi-stalked shrubs. However, the individual trunks of the arborescent form may be tree-sized themselves, arising from a single base up to 1 m (39 in) in diameter before diverging into separate boles. This community type represents a grazing disclimax. *Salix lutea* (yellow willow) dominates the upper shrub layer, with varying amounts of willows, *Cornus stolonifera* (red-osier dogwood), *Ribes* (currants and gooseberries), and *Rosa* species (rose) composing the lower shrub level. Common herbaceous species include *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Galium* species (bedstraw), *Cirsium arvense* (Canada thistle), and *Smilacina stellata* (starry Solomon-plume) (Table 53).

Table 53. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Salix lutea* (yellow willow) community type (number = 26 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Cornus stolonifera (red-osier dogwood)	23	0-98	62
Ribes lacustre (swamp currant)	7	0-10	27
Ribes odoratum (buffalo currant)	2	0-3	42
Rosa woodsii (woods rose)	10	0-20	69
Salix exigua (sandbar willow)	14	0-70	38
Salix lutea (yellow willow)	47	1-98	100
Graminoids			
Agrostis stolonifera (redtop)	33	0-90	35
Poa pratensis (Kentucky bluegrass)	13	0-80	42
Forbs			
Cirsium arvense (Canada thistle)	10	0-50	42
Smilacina stellata (starry Solomon-plume)	7	0-10	27
Solidago canadensis (Canada goldenrod)	7	0-20	27
Urtica dioica (stinging nettle)	5	0-10	38

SUCCESSIONAL INFORMATION

The *Salix lutea* (yellow willow) community type represents an early/mid-seral grazing disclimax of the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type or the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type (Hansen and others 1995). Physiological site changes, as a product of natural or human-related disturbances, may shift the potential climax vegetation to types in the *Populus tremuloides* (quaking aspen) series, the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type.

SOILS

Brichta (1987) indicates that soils occupied by this habitat type in Idaho may be classified as Entisols (Fluvents) or Mollisols. Soil textures of the upper surface horizons range from silty clays to sandy loams. These surface layers may be 1 m (39 in) or more deep and are often integrated with high quantities of organic material. Alluvial deposits of sands and fine gravels may form irregular lenses throughout the soil solum on active or secondary floodplains. Underlying substrates are generally fine or coarse sands and gravels. Water tables may be at the surface or as deep as 1 m (39 in), but are expected to provide soil moisture to the upper horizons for the majority of the growing season. Oxidation and reduction reactions produce mottled or gleyed features in the soil solum where groundwater is prevalent. Litter/duff layers may occur on sites with infrequent disturbance, and may be 10 cm (4 in) thick.

ADJACENT COMMUNITIES

Sedges, rushes, spikesedges, and *Phalaris arundinacea* (reed canarygrass) occupy adjacent sites where surface water is readily available. Less disturbed sites may be occupied by either the *Salix lutea/Calamagrostis canadensis* (yellow willow/bluejoint reedgrass) habitat type, or, under more saturated conditions, the *Salix lutea/Carex rostrata* (yellow willow/beaked sedge) habitat type. The *Populus trichocarpa/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type or the *Populus angustifolia/Cornus stolonifera* (narrowleaf cottonwood/red-osier dogwood) community type often occur on drier, upper floodplains. Where *Salix lutea* (yellow willow) is present as part of a mosaic, other willows and a variety of shrubs such as *Crataegus douglasii* (black hawthorn) and *Betula occidentalis* (water birch), may be present. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper) shrublands or *Artemisia tridentata* (big sagebrush)/ grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Where stands of this type are open and allow access for livestock, forage productivity may be high, resulting in potentially heavy utilization, especially as upland vegetation dries. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants.

Fewer shoots may be produced, but total aboveground biomass tends to be greater (Hansen and others 1995).

Overuse by livestock will result in a reduced vigor by the willows present, as illustrated by highlining, clubbing, or dead clumps. With continued overuse, willows showed a sharp decline in vigor and may be eventually eliminated from the site (Hansen and others 1995).

To minimize undesired changes in community composition and structure, pasture or allotment management should be based on the forage available from stands of this and other riparian or wetland communities. This concept of the riparian or wetland pasture has had some success in maintaining or improving the health of riparian or wetland vegetation (Kinch 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife
Big game utilize this type for both summer and winter forage and browse. Winter elk use may be heavy (Gaffney 1941).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated. (Hansen and others 1995)

Fisheries
Willow communities function in a variety of capacities to promote stream health and enhance fisheries. *Salix lutea* (yellow willow) forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme temperature fluctuations. It may act as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Herbaceous understory species trap sediments, essentially building streambanks and filtering steam flows. As a source of food and building material, willows attract beaver. Beaver ponds may provide excellent fishing opportunities if free of dense aquatic vegetation and numerous snags (Hansen and others 1995).

Fire
Prescribed burning in this type is an effective method of rejuvenating decadent clumps. The various willow species present in this type sprout vigorously following fire, especially in wetter stands. Quick, hot fires result in more sprouts than slower fires, which are potentially more damaging to the willows and tends to result in fewer sprouts (Hansen and others 1995).

Poa pratensis (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

After burning, the site should be eliminated from livestock grazing for at least 2 to 3 years to avoid attracting livestock to young, palatable regrowth.

Soil Management and Rehabilitation Opportunities
Soils are easily damaged from trampling by livestock if grazed when moist. This disturbance often leads to soil compaction, streambank sloughing, damage to vegetation, and premature drying of the soil surface. Woody species provide the greatest amount of streambank protection. Herbaceous species rarely afford sufficient stream bank protection. Management should emphasize the importance of willows in protecting the streambank (Hansen and others 1995).

Salix lutea (yellow willow) is useful in streambank stabilization and revegetation projects (Platts and others 1987). Cuttings should be first rooted then grown in a nursery to insure survival. *Salix lutea* (yellow willow) produces an abundance of roots, mostly along the lower one-third of the cut stem. Cuttings are best taken in the spring from dormant two to four year old wood. Cuttings 30-50 cm (12-20 in) long and greater than 1 cm (0.5 in) in diameter produces the best results. Roots and shoots from cuttings can be expected to appear 10 days after planting. However, nursery grown containerized plants will have the greatest survival rates and growth rates (Hansen and others 1995).

Recreational Uses and Considerations
Salix lutea (yellow willow) may form dense stands, preventing fishing access to anglers. However, where

disturbance is prevalent, stands may become more open and provide greater opportunities for recreational activities When locating structures for camping or other purposes in this community type, avoid active floodplains or other sites that may be prone to disturbance (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Youngblood and others (1985b) identified a comparable *Salix lutea* (yellow willow) community type in eastern Idaho and western Wyoming. Hansen and others (1995) also document this type for the state of Montana in the *Classification and Management of Montana's Riparian and Wetland Sites*.

Acer grandidentatum Community Type
(Bigtooth Maple Community Type)

ACEGRA (ACGR)
Number of Stands Sampled = 4

CAUTION—Not all sites currently dominated by *Acer grandidentatum* (bigtooth maple) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Acer grandidentatum* (bigtooth maple) community type is an incidental type at mid elevations throughout foothills and valleys across eastern and southern Idaho. Stands may be located on hillsides immediately below springs and seeps or on upper floodplains of narrow canyon drainages characterized by surface or ephemeral flow. This community type occupies marginally riparian zones as small dense thickets, narrow stingers, or irregular patches, and appears intolerant of prolonged or frequent flooding. Sites range in elevation from 1,600 to 1,950 m (5,280 to 6,435 ft).

VEGETATION

An arborescent (tree-like) shrub, *Acer grandidentatum* (bigtooth maple) may reach heights of 10 m (33 ft) or more, often forming a dense, overhead canopy. Understory layers are extremely variable. *Urtica dioica* (stinging nettle), *Osmorhiza chilensis* (mountain sweet-cicely), and *Heracleum lanatum* (cow-parsnip) may exhibit extremely dense growth on some sites, while on other sites, understory species such as *Thalictrum occidentale* (western meadowrue) or *Smilacina stellata* (Solomon's seal) may occur only in trace amounts (Table 54). The levels and types of disturbances may account for the variability of species and covers between sites. *Galium* species (bedstraw) is a constant in the understory, and *Prunus virginiana* (common choke-cherry) appears in most stands, although often in a decadent state.

Table 54. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Acer grandidentatum* (bigtooth maple) community type (number = 4 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus tremuloides (quaking aspen)	1	0-1	25
Shrubs			
Acer glabrum (Rocky Mountain maple)	1	0-1	25
Acer grandidentatum (bigtooth maple)	90	80-98	100
Amelanchier alnifolia (western serviceberry)	10	0-10	25
Berberis repens (creeping Oregongrape)	8	0-10	75
Cornus stolonifera (red-osier dogwood)	1	0-1	25
Prunus virginiana (common chokecherry)	9	3-20	100
Ribes lacustre (swamp currant)	1	0-1	25
Ribes setosum (Missouri gooseberry)	3	0-3	25
Rosa woodsii (woods rose)	1	0-1	25
Rubus parviflorus (thimbleberry)	20	0-20	25
Sambucus racemosa (red elderberry)	3	0-3	25
Symphoricarpos oreophilus (mountain snowberry)	3	0-3	25
Graminoids			
Bromus carinatus (mountain brome)	3	0-3	25
Bromus inermis (smooth brome)	3	0-3	25
Bromus tectorum (cheatgrass)	3	0-3	25
Carex backii (Back's sedge)	1	0-1	25
Elymus glaucus (blue wildrye)	7	0-10	50
Festuca subulata (bearded fescue)	1	0-1	25
Grass perennial (perennial grass)	3	0-3	25
Poa bulbosa (bulbous bluegrass)	3	0-3	25
Forbs			
Actaea rubra (baneberry)	3	0-3	25
Epilobium ciliatum (common willow-herb)	1	0-1	25
Galium aparine (goose-grass)	30	0-50	50
Galium triflorum (sweetscented bedstraw)	30	0-30	25
Geum aleppicum (yellow avens)	3	0-3	25
Heracleum lanatum (cow-parsnip)	20	0-20	25
Lactuca serriola (prickly lettuce)	2	0-3	50
Leonurus cardiaca (motherwort)	3	0-3	25
Montia perfoliata (miner's lettuce)	3	0-3	25
Onopordum acanthium (Scotch thistle)	1	0-1	25
Osmorhiza chilensis (mountain sweet-cicely)	15	0-20	50
Rudbeckia occidentalis (black head)	3	0-3	25
Silene menziesii (Menzies' silene)	3	0-3	25
Smilacina racemosa (false spikenard)	7	0-10	50
Smilacina stellata (starry Solomon-plume)	3	0-3	25
Taraxacum officinale (common dandelion)	3	0-3	25
Thalictrum occidentale (western meadowrue)	3	0-3	50

Table 54 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Tragopogon dubius (goat's beard)	1	0-1	25
Urtica dioica (stinging nettle)	11	0-20	50

SUCCESSIONAL INFORMATION

The *Acer grandidentatum* (bigtooth maple) community type appears to be a successional phase of the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type at mid elevations where their ranges overlap. At higher elevations, it may act as an early to mid-seral stage for *Populus tremuloides* (quaking aspen) types, the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. *Acer grandidentatum* (bigtooth maple) grows taller than *Prunus virginiana* (common chokecherry) and may replace it completely in locations where these species coexist.

SOILS

Soils typically classify as Mollisols or Entisols. On sites where disturbance is infrequent, a comprehensive litter/duff layer 5 cm (2 in) or more thick, composed of leaf material and twigs, blends into an organic (O_a or O_e) horizon. Surface soil textures range from silt loams to silty clay loams, although *Acer grandidentatum* (bigtooth maple) appears able to occupy sandy sites outside of the riparian zone as well. Alluvial sand, gravel, and cobble occur sporadically at the surface and generally constitute the main body of subsurface materials. *Acer grandidentatum* (bigtooth maple) may prefer well-drained, more developed soils that afford good rooting depth and moderate fertility. Water tables are generally well below the surface, but may occur within 60 cm (24 in) on some sites. This community type appears to be intolerant of frequent or prolonged flooding.

ADJACENT COMMUNITIES

Riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities, in response to differences in moisture regimes, substrate composition, flooding frequency and a variety of other physical site factors. The *Acer grandidentatum* (bigtooth maple) community type may be associated with a variety of other shrub communities dominated by willows, *Prunus virginiana* (common chokecherry), *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), and *Crataegus douglasii* (black hawthorn). *Populus tremuloides* (quaking aspen), *Pseudotsuga menziesii* (Douglas fir), *Populus angustifolia* (narrowleaf cottonwood), and *Acer negundo* (box-elder) types may occupy neighboring sites along riparian corridors as well. Adjacent drier communities are typically dominated by *Juniperus scopulorum* (Rocky Mountain juniper) woodlands and *Artemisia tridentata* (big sagebrush)/grasslands.

In Arizona and New Mexico, *Acer grandidentatum* (bigtooth maple) also occurs with cottonwood, ash, alder, and willows, forming deciduous riparian woodlands. Above the mountain-brush zone in northern Utah and southeastern Idaho, *Acer grandidentatum* (bigtooth maple) generally occurs as scattered individuals within *Pseudotsuga menziesii* (Douglas-fir), *Abies lasiocarpa* (subalpine fir), or *Abies concolor* (white fir) habitat types (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Acer grandidentatum (bigtooth maple) provides some browse for livestock species, but is typically consumed only in small or moderate amounts. Where it forms closed, overstory canopies along streams in canyon bottoms, this community type offers thermal and hiding cover for livestock.

Wildlife

In general, *Acer* species (maple) thickets provide good hiding cover for big game animals. Mule deer favor such areas for bedding and hiding. *Acer grandidentatum* (bigtooth maple) is an important food source for moose in southeastern Idaho and is considered a key browse species. It is valuable as forage for elk as well. The seeds, buds, and flowers of *Acer* species (maple) provide food for numerous species of birds and small mammals (Lackschewitz 1991). Squirrels and chipmunks eat the seeds, frequently storing them in caches after removing the hull and wing. Crude protein content of *Acer grandidentatum* (bigtooth maple) leaves collected in mid-September after tissue growth ceased, but before the first frost, was 9.5 percent (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999.)

In the Wasatch Mountains of Utah, several species of birds nest in *Acer grandidentatum* (bigtooth maple)-*Quercus gambelii* (Gambel's oak) communities. The California quail, ring-necked pheasant, scrub jay, black-billed magpie, black-capped chickadee, and rufous-sided towhee are all permanent residents of these communities. Ruffed and blue grouse often breed and rear their young in *Acer grandidentatum* (bigtooth maple) stands in southeastern Idaho (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Fisheries

Acer grandidentatum (bigtooth maple) stands form dense overhead canopies and maintain cooler water temperatures during hot summer months where they occur adjacent to stream channels. The understory component varies considerably, and although the root systems of *Acer grandidentatum* (bigtooth maple) may stabilize streambanks, a sparse understory component may not contribute to sediment filtering or erosion control.

Fire
The limited information regarding fire effects on *Acer grandidentatum* (bigtooth maple) indicates that this species has low fire tolerance. Research conducted with the closely related and ecologically similar *Acer saccharum* (sugar maple) of eastern forests showed it to be a poor sprouter following burning. Following bole-killing fires, *Acer saccharum* (sugar maple) trees produced only a few sprouts of low vigor or failed to sprout altogether. Current information suggests that *Acer grandidentatum* (bigtooth maple) is also a poor sprouter (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999). Using fire to thin stands or promote resprouting may actually eliminate the *Acer grandidentatum* (bigtooth maple) component.

Soil Management and Rehabilitation Opportunities
The litter/duff layer protects surface soils from minor compaction; however, during the spring when soils are saturated and susceptible to compaction, livestock and vehicular traffic use should be restricted in riparian zones.

Acer grandidentatum (bigtooth maple) is recommended for use in revegetating disturbed riparian sites in the Intermountain region and is suitable for planting for wildlife cover and roadside stabilization. It has been proposed for use in rehabilitating strip-mined lands and for planting on denuded recreation sites. It is best to transplant 2-year-old bare rootstock or container-grown seedlings in the early spring when dormant. *Acer grandidentatum* (bigtooth maple) can also be established from seed planted to a depth of 1.25 cm (0.5 inch) in sunny areas if straw mulch is added (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Acer grandidentatum (bigtooth maple) produces seeds and provides cover attractive to a variety of wildlife species and may offer decent viewing opportunities for bird watchers and other naturalists. A member of the maple family, *Acer grandidentatum* (bigtooth maple) may exhibit vibrant fall foliage and can be used in conjunction with landscaping projects. Where the understory is sparse, picnicking and primitive camping are also an option where this community develops.

Although not produced commercially, maple syrup can be made from the sap of *Acer grandidentatum* (bigtooth maple). It takes about 43 gallons of sap to produce 1 gallon of syrup. The syrup produced from *Acer grandidentatum* (bigtooth maple) has a milder flavor than that of *Acer saccharum* (sugar maple) syrup. Results from taste tests indicate that 57 percent of the participants preferred syrup from *Acer saccharum* (sugar maple) to that of *Acer grandidentatum* (bigtooth maple) (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This community type has not been described by other riparian and wetland classifications. However, on national forests in Arizona and New Mexico, an *Abies concolor/Acer grandidentatum* (white fir/bigtooth maple) habitat type has been identified that typically dominates riparian zones along canyon bottoms (Moir and Ludwig 1979).

Alnus incana Community Type
(Mountain Alder Community Type)

ALNINC (ALIN2)
Number of Stands Sampled = 29

LOCATION AND ASSOCIATED LANDFORMS

The *Alnus incana* (mountain alder) community type appears throughout mountains, foothills, and valleys of eastern Idaho. This minor type ranges in elevation from 1,272 to 2,100 m (4,200 to 6,930 ft). It forms narrow strips along banks and floodplains of fast moving streams in canyon bottoms, irregular clusters near hillside springs and seeps, or bands along the perimeter of beaver ponds. The *Alnus incana* (mountain alder) community type generally represents one of any number of discreet riparian communities that occupy microsites along stream and riverine systems and form the mosaic pattern of vegetation common to so many riparian corridors.

VEGETATION

Alnus incana (mountain alder) establishes a dense overstory canopy in the upper layer of the two-tiered shrub segment characteristic of this community type. Trunks of *Alnus incana* (mountain alder) often parallel the ground for a number of feet before attaining a more vertical growth form, developing nearly impenetrable stands in some locations. Less well-represented shrubs in the lower strata include *Cornus stolonifera* (red-osier dogwood) and *Ribes* (currants and gooseberries). A variety of graminoids and forbs compose the undergrowth, including, but not limited to, sedges, *Poa pratensis* (Kentucky bluegrass), *Heracleum lanatum* (cow-parsnip), *Smilacina stellata* (starry Solomon-plume), and *Equisetum arvense* (field horsetail) (Table 55). Moss may be present in scattered pockets where sufficient moisture is available.

Table 55. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Alnus incana* (mountain alder) community type that are relatively undisturbed by livestock or wildlife (number = 4 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	1	0-1	25
Picea species (spruce)	1	0-1	25
Shrubs			
Alnus incana (mountain alder)	60	20-98	100
Betula occidentalis (water birch)	1	0-1	25
Cornus stolonifera (red-osier dogwood)	25	0-30	50
Ribes species (currant; gooseberry)	6	0-10	50
Ribes hudsonianum (stinking currant)	80	0-80	25
Ribes lacustre (swamp currant)	50	0-50	25
Rubus idaeus (red raspberry)	10	0-10	25
Rubus parviflorus (thimbleberry)	1	0-1	25
Symphoricarpos species (snowberry)	1	0-1	25
Graminoids			
Agrostis idahoensis (Idaho bentgrass)	10	0-10	25
Calamagrostis canadensis (bluejoint reedgrass)	10	0-10	25
Cinna latifolia (drooping woodreed)	10	0-10	25
Elymus glaucus (blue wildrye)	1	0-1	25
Glyceria elata (tall mannagrass)	1	0-1	50
Glyceria grandis (American mannagrass)	1	0-1	25
Glyceria striata (fowl mannagrass)	1	0-1	25
Luzula parviflora (small-flowered woodrush)	1	0-1	25
Poa palustris (fowl bluegrass)	1	0-1	25
Forbs			
Actaea rubra (baneberry)	1	0-1	50
Aster occidentalis (western aster)	10	0-10	25
Cardamine oligosperma (few-seeded bittercress)	1	0-1	25
Epilobium angustifolium (fireweed)	1	0-1	25
Epilobium ciliatum (common willow-herb)	1	1-1	100
Galium triflorum (sweetscented bedstraw)	1	0-1	50
Geum macrophyllum (larged-leaved avens)	1	0-1	75
Heracleum lanatum (cow-parsnip)	6	0-10	50
Mertensia ciliata (mountain bluebell)	1	0-1	25
Mimulus guttatus (common monkey-flower)	1	0-1	25
Mimulus moschatus (musk-flower)	1	0-1	25
Montia chamissoi (water montia)	1	0-1	25
Osmorhiza chilensis (mountain sweet-cicely)	1	0-1	25
Prunella vulgaris (self-heal)	1	0-1	25
Pyrola secunda (one-sided wintergreen)	1	0-1	25
Saxifraga arguta (brook saxifrage)	1	0-1	25
Senecio triangularis (arrowleaf groundsel)	4	0-10	75
Stellaria calycantha (northern starwort)	1	0-1	25
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	25
Thalictrum occidentale (western meadowrue)	1	0-1	50
Urtica dioica (stinging nettle)	18	1-50	100
Veronica americana (American speedwell)	1	0-1	25
Veratrum viride (green false hellebore)	3	0-3	25
Ferns and Allies			
Athyrium filix-femina (ladyfern)	30	0-30	25
Equisetum arvense (field horsetail)	1	0-1	25
Fern	1	0-1	25

SUCCESSIONAL INFORMATION

Populus tremuloides (quaking aspen) types or *Salix geyeriana* (Geyer willow) types may represent the climax vegetation on wetter sites occupied by the *Alnus incana* (mountain alder) community type. However, where beaver have decimated stands of either of these types, *Alnus incana* (mountain alder) may persist as the dominant species for longer periods. Slightly drier locations occupied by the *Alnus incana* (mountain alder) community type may be successional to either the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. *Alnus incana* (mountain alder) often remains present as an understory component in both of these communities. Hansen and others (1995) indicate that the *Alnus incana* (mountain alder) community type acts as a mid-seral disturbance type and tends to establish after severe disturbance. Stands in Montana are located along mined streams (placer mining), streams with yearly ice jam problems, or streams that were used historically in transporting logs to mills (streams with a high occurrence of splash dams).

Table 56. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Alnus incana* (mountain alder) (number = 25 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Abies lasiocarpa (subalpine fir)	3	0-3	4
Juniperus scopulorum (Rocky Mountain juniper)	2	0-3	16
Picea species (spruce)	2	0-3	8
Populus angustifolia (narrowleaf cottonwood)	1	0-1	8
Populus tremuloides (quaking aspen)	3	0-3	4
Populus trichocarpa (black cottonwood)	3	0-3	4
Pseudotsuga menziesii (Douglas fir)	1	0-1	8
Salix amygdaloides (peach-leaf willow)	3	0-3	4
Shrubs			
Acer glabrum (Rocky Mountain maple)	2	0-3	8
Alnus incana (mountain alder)	56	20-98	100
Betula occidentalis (water birch)	2	0-3	12
Clematis ligusticifolia (western virgins-bower)	20	0-20	4
Clematis occidentalis (Columbia clematis)	1	0-1	4
Cornus stolonifera (red-osier dogwood)	26	0-50	40
Crataegus douglasii (black hawthorn)	1	0-1	4
Elaeagnus commutata (silverberry)	1	0-1	4
Lonicera involucrata (twin-berry)	2	0-3	8
Potentilla fruticosa (shrubby cinquefoil)	3	0-3	4
Prunus virginiana (common chokecherry)	3	0-3	4
Ribes cereum (squaw currant)	1	0-1	4
Ribes species (currant; gooseberry)	3	0-10	16
Ribes hudsonianum (stinking currant)	4	0-10	16
Ribes inerme (whitestem gooseberry)	1	0-1	4
Ribes lacustre (swamp currant)	7	0-20	12
Ribes odoratum (buffalo currant)	3	0-3	4
Rosa acicularis (prickly rose)	5	0-10	12
Rosa woodsii (woods rose)	11	0-40	32
Rubus idaeus (red raspberry)	4	0-10	20
Rubus parviflorus (thimbleberry)	1	0-1	4
Salix bebbiana (Bebb willow)	2	0-3	8
Salix boothii (Booth willow)	2	0-3	16
Salix candida (hoary willow)	3	0-3	4
Salix drummondiana (Drummond willow)	2	0-3	12
Salix exigua (sandbar willow)	3	0-3	12
Salix geyeriana (Geyer willow)	1	0-1	8
Salix lasiandra (Pacific willow)	1	0-1	4
Salix lutea (yellow willow)	1	0-3	20
Spiraea betulifolia (shiny-leaf spiraea)	1	0-1	4
Symphoricarpos albus (common snowberry)	2	0-3	8
Symphoricarpos occidentalis (western snowberry)	3	0-3	4
Symphoricarpos species (snowberry)	20	0-20	4
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	4
Agrostis exarata (spike bentgrass)	20	0-20	4
Agropyron species (wheatgrass)	1	0-1	4
Agropyron repens (quackgrass)	6	0-10	8
Agrostis scabra (tickle-grass)	1	0-1	4
Agropyron spicatum (bluebunch wheatgrass)	20	0-20	4
Agrostis stolonifera (redtop)	11	0-40	36
Bromus ciliatus (fringed brome)	3	0-10	20
Bromus inermis (smooth brome)	21	0-40	8
Bromus species (brome)	3	0-3	4
Calamagrostis canadensis (bluejoint reedgrass)	40	0-70	28
Calamagrostis stricta (narrow-spiked reedgrass)	9	0-20	16
Carex aquatilis (water sedge)	1	0-1	8
Carex brevior (short-beaked sedge)	3	0-3	4
Carex deweyana (Dewey's sedge)	1	0-1	4
Carex disperma (soft-leaved sedge)	1	0-1	4
Carex species (sedge)	3	0-3	4
Carex lanuginosa (woolly sedge)	2	0-3	12
Carex microptera (small-winged sedge)	2	0-3	16
Carex nebrascensis (Nebraska sedge)	80	0-80	4
Carex pachystachya (thick-headed sedge)	3	0-3	4
Carex rostrata (beaked sedge)	8	0-20	12
Carex stipata (sawbeak sedge)	1	0-1	8
Cinna latifolia (drooping woodreed)	10	0-10	4
Elymus cinereus (basin wildrye)	7	0-10	8
Glyceria borealis (northern mannagrass)	3	0-3	4
Glyceria elata (tall mannagrass)	20	0-30	12
Glyceria grandis (American mannagrass)	10	0-10	4
Glyceria striata (fowl mannagrass)	4	0-10	16
Hordeum jubatum (foxtail barley)	1	0-1	8

Table 56 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Juncus balticus (Baltic rush)	8	0-20	12
Juncus ensifolius (dagger-leaf rush)	10	0-10	4
Luzula parviflora (small-flowered woodrush)	3	0-3	4
Phalaris arundinacea (reed canarygrass)	10	0-10	4
Phleum pratense (common timothy)	10	0-40	40
Poa bulbosa (bulbous bluegrass)	3	0-3	4
Poa palustris (fowl bluegrass)	9	0-40	44
Poa pratensis (Kentucky bluegrass)	8	0-20	44
Scirpus maritimus (alkali bulrush)	1	0-1	4
Forbs			
Achillea millefolium (common yarrow)	2	0-3	12
Actaea rubra (baneberry)	2	0-3	16
Angelica arguta (sharptooth angelica)	1	0-3	20
Aquilegia formosa (sitka columbine)	12	0-20	8
Arabis glabra (towermustard)	1	0-1	4
Arctium minus (common burdock)	1	0-1	8
Arnica chamissonis (meadow arnica)	1	0-1	4
Arnica cordifolia (heart-leaf arnica)	1	0-1	4
Arnica mollis (hairy arnica)	1	0-1	4
Artemisia lindleyana (riverbank wormwood)	1	0-1	4
Aster chilensis (long-leaved aster)	1	0-1	8
Aster conspicuus (showy aster)	1	0-1	4
Aster eatonii (Eaton's aster)	7	0-10	8
Aster species (aster)	11	0-20	8
Aster foliaceus (leafy aster)	3	0-3	4
Aster modestus (few-flowered aster)	7	0-20	12
Aster occidentalis (western aster)	4	0-10	32
Astragalus species (milk-vetch; orophaca)	1	0-1	8
Castilleja miniata (scarlet paintbrush)	1	0-1	4
Cicuta maculata (spotted water-hemlock)	2	0-3	12
Cirsium arvense (Canada thistle)	12	0-40	24
Cirsium vulgare (bull thistle)	1	0-1	8
Cynoglossum officinale (common hound's-tongue)	2	0-3	8
Epilobium angustifolium (fireweed)	2	0-3	12
Epilobium ciliatum (common willow-herb)	7	0-20	20
Epilobium species (willow-herb)	1	0-1	4
Forb	3	0-3	4
Fragaria virginiana (Virginia strawberry)	1	0-1	20
Galium boreale (northern bedstraw)	1	0-1	4
Galium species (bedstraw)	1	0-1	4
Galium trifidum (small bedstraw)	10	0-10	4
Galium triflorum (sweetscented bedstraw)	1	0-3	28

Table 56 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Gentianella detonsa (smaller fringed gentian)	1	0-1	4
Geranium species (geranium; crane's-bill)	1	0-1	4
Geranium richardsonii (white geranium)	1	0-1	8
Geranium viscosissimum (sticky geranium)	7	0-10	8
Geum macrophyllum (larged-leaved avens)	4	0-10	40
Geum rivale (water avens)	1	0-1	4
Glycyrrhiza lepidota (American licorice)	20	0-20	4
Habenaria dilatata (white orchis)	1	0-1	4
Heracleum lanatum (cow-parsnip)	6	0-30	40
Lactuca serriola (prickly lettuce)	1	0-1	12
Lappula redowskii (western stickseed)	1	0-1	4
Medicago sativa (alfalfa)	1	0-1	4
Melilotus officinalis (yellow sweet-clover)	1	0-1	4
Mentha arvensis (field mint)	5	0-20	32
Mentha X piperita (peppermint)	3	0-3	4
Mertensia ciliata (mountain bluebell)	3	0-3	8
Mimulus guttatus (common monkey-flower)	6	0-10	20
Montia chamissoi (water montia)	1	0-1	4
Nasturtium officinale (water-cress)	10	0-10	4
Nepeta cataria (catnip)	3	0-3	8
Osmorhiza chilensis (mountain sweet-cicely)	9	0-30	16
Osmorhiza occidentalis (western sweet-cicely)	5	0-10	12
Pedicularis species (lousewort)	1	0-1	4
Potentilla arguta (tall cinquefoil)	1	0-1	4
Ranunculus macounii (Macoun's buttercup)	1	0-1	4
Ranunculus species (buttercup)	3	0-3	4
Rubus pubescens (dwarf red blackberry)	1	0-1	4
Rudbeckia hirta (black-eyed Susan)	3	0-3	4
Rudbeckia occidentalis (black head)	2	0-3	8
Rumex acetosa (meadow sorrel)	1	0-1	4
Senecio integerrimus (western groundsel)	1	0-1	4
Senecio triangularis (arrowleaf groundsel)	10	0-10	4
Smilacina stellata (starry Solomon-plume)	6	0-30	44
Solidago canadensis (Canada goldenrod)	2	0-3	24
Solidago gigantea (late goldenrod)	3	0-3	4
Stellaria calycantha (northern starwort)	1	0-1	4

Table 56 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Stellaria longipes (longstalk starwort)	1	0-1	12
Streptopus amplexifolius (clasping-leaved twisted-stalk)	1	0-1	8
Taraxacum officinale (common dandelion)	2	0-3	44
Thalictrum dasycarpum (purple meadowrue)	1	0-1	4
Thalictrum occidentale (western meadowrue)	1	0-1	16
Tragopogon dubius (goat's beard)	1	0-1	4
Trifolium longipes (long-stalked clover)	1	0-1	4
Trifolium repens (white clover)	6	0-40	36
Typha latifolia (common cattail)	1	0-1	4
Urtica dioica (stinging nettle)	15	0-70	32
Veronica americana (American speedwell)	16	0-30	8
Veronica anagallis-aquatica (water speedwell)	1	0-1	4
Veratrum californicum (California false hellebore)	3	0-3	4
Vicia americana (American vetch)	1	0-1	4
Viola species (violet)	6	0-20	16
Athyrium filix-femina (ladyfern)	10	0-10	4
Ferns and Allies			
Equisetum arvense (field horsetail)	8	0-60	60
Equisetum hyemale (common scouring-rush)	3	0-3	4
Equisetum laevigatum (smooth scouring-rush)	2	0-3	16

SOILS

Soils are typically Entisols (Fluvents) and Mollisols (Borolls), although Inceptisols (Ochrepts) may be present on some sites (Padgett and others 1989). Nutrient rich surface horizons, extending to depths of 25 cm (10 in) or more, have a silty clay or silty clay loam texture. Underlying substrates are predominantly alluvial sands, gravels and cobbles, or in some cases, bedrock. *Alnus incana* (mountain alder) tolerates both frequent and prolonged flooding, and seems to prefer sites containing unconsolidated coarse fragments in the lower soil profile that promote subsurface flow of aerated ground water (Padgett and others 1989). Mottled and gleyed soil characteristics may be observed where near surface water tables promote oxidation/reduction reactions. *Alnus* species (alder) cycle nitrogen into the soil through root nodules and nitrogen-rich leaf litter, increasing soil fertility. Where sites occur above the active floodplain, leaf litter may accumulate in excess of 5 cm (2 in).

ADJACENT COMMUNITIES

Alnus incana (mountain alder) seldom dominates an entire drainage as a single monotype, but is generally distributed throughout riparian corridors with a variety of other species, each occupying specific microsites according to moisture, substrate, and a variety of other physical factors. Associated shrub communities may include *Cornus stolonifera* (red-osier dogwood), *Betula occidentalis* (water birch), *Salix geyeriana* (Geyer willow), *Salix lasiandra* (Pacific willow), and *Salix boothii* (Booth willow). Sedge and spikesedge) types colonize the streamside zone and immediate shallows. *Pseudotsuga menziesii* (Douglas fir) and *Populus tremuloides* (quaking aspen) forests may occupy both the riparian corridors and the adjacent drier uplands. *Juniperus scopulorum* (Rocky Mountain juniper)/ grasslands and *Artemisia tridentata* (big sagebrush) steppe establish on upland hillsides and plains.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) note that this type is of limited value for livestock because of the typically dense shrub layer. Stands that are more open provide moderate amounts of forage, and are used as a source of summer shade. *Alnus incana* (mountain alder) is infrequently browsed by livestock but is susceptible to trampling damage as animals search for palatable plants (Kovalchik 1986, Kovalchik 1987). Dense stands of *Alnus incana* (mountain alder) hinder access by cattle, but heavy grazing can result in the loss of this type by creating a dish-shaped stream channel and a water regime unsuitable for *Alnus incana* (mountain alder).

Wildlife

Browsing of older *Alnus incana* (mountain alder) stems is typically low but use of young twigs, sprouts, and associated shrubs and grasses may be heavy. The high structural diversity of this community type provides thermal and hiding cover for ungulates such as whitetail and mule deer (Healy and Gill 1974). Elk may make light to moderate use of *Alnus incana* (mountain alder) community type during the summer and fall (Kufeld 1973). Associated shrub and herbaceous species also provide browse and forage. Numerous bird species use this type for both food and nesting (Hansen and others 1995).

Fisheries

Alnus incana (mountain alder), more than other shrub species, exhibits a horizontal growth form at the ground level that provides excellent cover and shade for fisheries. This community type helps to stabilize streambanks, creates overhanging banks, and lessens erosion caused by spring floods. Streams lined with this community type may develop deep and narrow channels, providing cover, spawning sites, food, and the cool temperatures favored by trout and other salmonoids (Hansen and others 1995).

Fire
In the *Alnus incana* (mountain alder) community type, all but light ground fires should be avoided. Intense burns will kill the shrub, leaving only a sparse herbaceous understory to protect the site from erosion and bank destabilization (Kovalchik 1986, Kovalchik 1987). However, *Alnus incana* (mountain alder) sprouts readily and retains its vigor when cut at four or five year intervals. Cutting in spring and winter results in rapid growth of sprouts, while cutting in mid summer produces fewer, slower growing sprouts. (Hansen and others 1995)

Soil Management and Rehabilitation Opportunities
Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should greatly consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
Recreational values of this community type are primarily connected with the associated high quality fishery. Dense stands limit canoe or raft access, and camping sites are often unsuitable due to moist or wet conditions (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Similar communities have been described for Idaho and western Wyoming by Tuhy and Jensen (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), and Chadde and others (1988). *Alnus incana* (mountain alder) dominated communities were also described for Utah and southeastern Idaho by Padgett and others (1989) and for portions of Oregon by Kovalchik (1987), and Montana by Hansen and others (1995). Finally, a somewhat similar community type was described by Szaro (1989) for Arizona and New Mexico.

Betula occidentalis Community Type (Water Birch Community Type)

BETOCC (BEOC2)
Number of Stands Sampled = 34

LOCATION AND ASSOCIATED LANDFORMS

The *Betula occidentalis* (water birch) community type is a minor type at low to mid elevations throughout valleys and foothills of central and eastern Idaho. Sites range from 1,484 to 1,879 m (4,900 to 6,200 ft). This community type develops on a wide range of landforms, from islands and broad floodplains associated with riverine systems to alluvial terraces along fast-flowing streams at the bottom of narrow U-and V-shaped canyons. In some instances, it is also located below springs and seeps on rocky hillsides. Stands of *Betula occidentalis* (water birch) may appear as irregular clusters near seeps, occur as bands along narrow alluvial shelves or develop into broader copses on extensive riverine floodplains.

VEGETATION

The *Betula occidentalis* (water birch) community type may exhibit a diversity of growth forms. *Betula occidentalis* (water birch) may appear as a multi-trunk shrub in some locales or as a single-trunk, medium tree-sized shrub elsewhere. Where a dense, secondary shrub layer is present, this type may display a two-layered profile, yet where it occurs on disturbed sites, such as active floodplains, understory species may be essentially absent. In general, however, *Betula occidentalis* (water birch) appears in shrub form, establishing a closed overhead canopy. *Rosa woodsii* (woods rose), *Salix exigua* (sandbar willow), and *Cornus stolonifera* (red-osier dogwood) are commonly associated shrubs. The graminoid and forb component, which is quite diverse, is usually dominated by disturbance-induced species, often represented by *Agrostis stolonifera* (redtop), *Poa pratensis* (Kentucky bluegrass), *Smilacina stellata* (starry Solomon-plume), *Glycyrrhiza lepidota* (American licorice), and *Equisetum* species (horsetail) (Table 57).

Table 57. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Betula occidentalis* (water birch) community type (number = 34 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Betula occidentalis (water birch)	58	10-98	100
Cornus stolonifera (red-osier dogwood)	13	0-50	56
Rosa woodsii (woods rose)	8	0-30	53
Salix bebbiana (Bebb willow)	6	0-20	32

Table 57 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Graminoids			
Agrostis stolonifera (redtop)	26	0-70	56
Phleum pratense (common timothy)	5	0-20	26
Poa pratensis (Kentucky bluegrass)	30	0-70	62
Forbs			
Aster species (aster)	6	0-20	26
Cirsium arvense (Canada thistle)	7	0-20	38
Smilacina stellata (starry Solomon-plume)	9	0-30	35
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	8	0-60	35

SUCCESSIONAL INFORMATION

The *Betula occidentalis* (water birch) community type may function as a seral stage for a variety of different climax communities. The presence of species representing climax vegetation types generally indicates the successional potential for a particular site, and should be noted. Conifers, particularly in the *Pseudotsuga menziesii/ Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type or *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) type, may eventually dominate slightly drier riparian zones. On alluvial shelves of mountain streams and saturated zones adjacent to beaver ponds, types in the *Populus tremuloides* (quaking aspen) series, the *Salix lutea* (yellow willow) series or the *Salix geyeriana* (Geyer willow) series may represent the climax vegetation. *Betula occidentalis* (water birch) may in turn function as a later seral stage, succeeding shorter-statured riparian shrubs such as *Alnus incana* (mountain alder), *Cornus stolonifera* (red-osier dogwood), or *Prunus virginiana* (common chokecherry).

SOILS

Padgett and others (1989) indicate that this community type typically occupies soils classified as Entisols (Fluvents) and Mollisols (Borolls). Sites located above the active floodplain may be covered with a litter/duff layer up to 15 cm (6 in) thick. Surface horizons vary considerably both in composition and depth; nutrient rich silty clay soils may extend to depths of 75 cm (30 in) or more at one location, while fine sands comprise a surface layer only 20 cm (8 in) thick in another. Subsurface layers are consistently sands, gravels and cobbles, or occasionally rock. Sporadic bands or pockets of alluvial coarse-grained material may be scattered throughout the soil profile. Water tables, which may be present at the surface, are generally 30 to 60 cm (12 to 24 in) deep, but may be lower. *Betula occidentalis* (water birch) appears able to withstand periodic flooding.

ADJACENT COMMUNITIES

Betula occidentalis (water birch) may colonize riparian corridors with a variety of other species, often creating patchy mosaics of distinct, individual communities. Associated communities may include *Cornus stolonifera* (red-osier dogwood), *Prunus virginiana* (common chokecherry), willows, or *Populus angustifolia* (narrowleaf cottonwood) types. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), and *Populus tremuloides* (quaking aspen) forests may occupy sites both in the riparian corridors and on the adjacent drier uplands. Sedges, *Juncus balticus* (Baltic rush), and *Phalaris arundinacea* (reed canarygrass) types establish on the adjacent streamside zones. *Artemisia tridentata* (big sagebrush) steppe and grasslands dominate upland hillsides and plateaus.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) indicate that forage productivity varies with the density of the stand. Dense stands limit livestock use. Herbaceous species such as *Agrostis stolonifera* (redtop) and *Poa pratensis* (Kentucky bluegrass) provide spring forage. *Poa pratensis* (Kentucky bluegrass) is a palatable and moderately productive grass, especially when soil moisture levels are high, and tolerates a high degree of defoliation. Herbage production is moderate. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Stem densities are emphasized over aboveground biomass. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater.

Agrostis stolonifera (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937). It is tolerant of close cropping due to its somewhat prostrate growth form, rhizomatous growth habit, and lower palatability than associated species.

Wildlife

Linear communities of *Betula occidentalis* (water birch) provide shade and hiding cover and travel corridors for numerous wildlife species. *Betula occidentalis* (water birch) is normally only lightly browsed, but if other woody species are scarce, use will occur (Hansen and others 1995). Its structural diversity also has high wildlife habitat values, especially for avian species (Youngblood and others 1985a).

Fisheries
Betula occidentalis (water birch) may function in a variety of capacities to promote stream health and enhance fisheries. It forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations. *Betula occidentalis* (water birch) may serve as a source of large woody debris or may trap large trees borne downstream, creating deeper pools and additional cover for fish species. Sedges and other associated mat-forming understory species trap sediments, essentially building streambanks and filtering steam flows (Hansen and others 1995).

Fire
Shoots of the thin barked *Betula occidentalis* (water birch) are readily killed by fire but plants resprout from uninjured basal buds. *Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can be used to control stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities
Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. Management should seriously consider maintaining this type because of its excellent streambank stabilization values (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
This community type offers excellent camping opportunities where it occurs on level ground and the understory is sparse. More dense stands may limit streamside access to anglers.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

Chadde and others (1988) and Hansen and others (1995) described a *Betula occidentalis* (water birch) community type having a variety of undergrowth species. Padgett and others (1989) identified several *Betula occidentalis* (water birch) community types for Utah. They are *Betula occidentalis/Cornus stolonifera* (water birch/red-osier dogwood), *Betula occidentalis*/Mesic Forb (water birch/Mesic Forb), and *Betula occidentalis/Poa pratensis* (water birch/Kentucky bluegrass) community types.

Cornus stolonifera Community Type
(Red-Osier Dogwood Community Type)

CORSTO (COST4)
Number of Stands Sampled = 27

LOCATION AND ASSOCIATED LANDFORMS

The *Cornus stolonifera* (red-osier dogwood) community type is an incidental type throughout foothills and valleys of Idaho. Sites range in elevation from 1,152 to 1,879 m (3,800 to 6,200 ft). It occupies a diversity of landforms and may appear as linear bands on alluvial benches of narrow canyon drainages or broad thickets on islands and floodplains of major stream and riverine systems. In some cases, it may even develop as a dense fringe around beaver ponds.

VEGETATION

Cornus stolonifera (red-osier dogwood) generally forms a closed canopy, often excluding understory shrub and herbaceous species. Disturbed stands tend to exhibit a more open structure and a greater diversity of species, although many of these are considered weedy varieties. *Rosa woodsii* (woods rose), *Salix exigua* (sandbar willow), and *Prunus virginiana* (common chokecherry) are commonly associated with this type. The herbaceous layer may be dominated by graminoids, particularly *Poa pratensis* (Kentucky bluegrass), *Elymus glaucus* (blue wildrye), or *Agrostis stolonifera* (redtop), although forbs such as *Smilacina stellata* (starry Solomon-plume), *Urtica dioica* (stinging nettle), and *Galium* species (bedstraw) are also present (Table 58).

Table 58. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Cornus stolonifera* (red-osier dogwood) community type that are relatively undisturbed by livestock or wildlife (number = 10 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Picea species (spruce)	1	0-1	10

Table 58 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Shrubs			
Berberis repens (creeping Oregongrape)	10	0-10	10
Betula occidentalis (water birch)	3	0-3	10
Clematis ligusticifolia (western virgins-bower)	2	0-3	30
Cornus stolonifera (red-osier dogwood)	88	50-98	100
Lonicera involucrata (twin-berry)	50	0-50	10
Prunus virginiana (common chokecherry)	2	0-3	30
Ribes lacustre (swamp currant)	1	0-1	10
Ribes odoratum (buffalo currant)	1	0-1	20
Ribes setosum (Missouri gooseberry)	1	0-1	10
Rosa woodsii (woods rose)	5	0-10	40
Salix exigua (sandbar willow)	2	0-3	30
Salix lasiandra (Pacific willow)	3	0-3	10
Salix lutea (yellow willow)	3	0-3	10
Solanum dulcamara (climbing nightshade)	10	0-10	10
Symphoricarpos occidentalis (western snowberry)	1	0-1	10
Graminoids			
Agropyron repens (quackgrass)	1	0-1	10
Bromus inermis (smooth brome)	1	0-1	10
Carex atherodes (awned sedge)	1	0-1	10
Carex species (sedges)	1	0-1	10
Carex rostrata (beaked sedge)	1	0-1	10
Elymus glaucus (blue wildrye)	3	0-3	10
Phalaris arundinacea (reed canarygrass)	10	0-10	10
Poa palustris (fowl bluegrass)	10	0-10	10
Poa pratensis (Kentucky bluegrass)	2	0-3	30
Forbs			
Arctium minus (common burdock)	2	0-3	20
Cirsium arvense (Canada thistle)	1	0-1	20
Epilobium paniculatum (autumn willow-herb)	1	0-1	10
Euphorbia esula (leafy spurge)	1	0-1	10
Galium triflorum (sweetscented bedstraw)	1	0-1	40
Geranium viscosissimum (sticky geranium)	2	0-3	20
Hackelia deflexa (nodding stickseed)	1	0-1	10
Heracleum lanatum (cow-parsnip)	1	0-1	20
Lactuca serriola (prickly lettuce)	3	0-3	10
Lysimachia ciliata (fringed loosestrife)	1	0-1	10
Mentha arvensis (field mint)	10	0-10	10
Nepeta cataria (catnip)	3	0-3	10
Potentilla flabellifolia (fan-leaf cinquefoil)	1	0-1	10
Rorippa palustris (marsh yellowcress)	3	0-3	10
Rumex crispus (curly dock)	1	0-1	10
Senecio serra (tall butterweed)	1	0-1	10
Smilacina racemosa (false spikenard)	10	0-10	10
Smilacina stellata (starry Solomon-plume)	2	0-3	30
Solidago canadensis (Canada goldenrod)	10	0-10	10
Taraxacum officinale (common dandelion)	1	0-1	10
Urtica dioica (stinging nettle)	2	0-3	40
Ferns and Allies			
Equisetum hyemale (common scouring-rush)	1	0-1	10

SUCCESSIONAL INFORMATION

Cornus stolonifera (red-osier dogwood) is the diagnostic shrub species associated with a variety of coniferous and deciduous tree habitat types. An early, primary successional stage, it may colonize stream banks, adjacent floodplains, and other disturbed sites characterized by alluvial materials and available moisture. Moderate soil development may alter the potential of the site to favor the gradual succession of climax stands, such as the *Picea/Cornus stolonifera* (spruce/red-osier dogwood) habitat type, the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type, or the *Populus tremuloides/Cornus stolonifera* (quaking aspen/red-osier dogwood) habitat type. *Salix* (willows) dominated communities, particularly *Salix geyeriana* (Geyer willow), *Salix lutea* (yellow willow), and *Salix drummondiana* (Drummond willow), may represent climax stands at some sites as well.

Table 59. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Cornus stolonifera* (red-osier dogwood) community type (number = 17 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Trees			
Juniperus scopulorum (Rocky Mountain juniper)	3	0-3	6
Populus trichocarpa (black cottonwood)	6	0-10	12
Shrubs			
Acer glabrum (Rocky Mountain maple)	10	0-10	6
Alnus incana (mountain alder)	10	0-10	6

Table 59 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Amelanchier alnifolia (western serviceberry)	1	0-1	6
Betula glandulosa (bog birch)	10	0-10	6
Clematis ligusticifolia (western virgins-bower)	15	0-20	12
Clematis occidentalis (Columbia clematis)	10	0-10	6
Cornus stolonifera (red-osier dogwood)	60	1-98	100
Crataegus columbiana (Columbia hawthorn)	10	0-10	6
Lonicera involucrata (twin-berry)	10	0-10	6
Philadelphus lewisii (mockorange; syringa)	10	0-10	6
Prunus virginiana (common chokecherry)	2	0-3	12
Rhamnus alnifolia (alder buckthorn)	10	0-10	6
Ribes species (currant; gooseberry)	3	0-3	12
Ribes hudsonianum (stinking currant)	1	0-1	6
Ribes lacustre (swamp currant)	1	0-1	6
Ribes odoratum (buffalo currant)	60	0-60	6
Ribes setosum (Missouri gooseberry)	1	0-1	6
Rosa acicularis (prickly rose)	1	0-1	6
Rosa species (rose)	10	0-10	6
Rosa woodsii (woods rose)	12	0-60	59
Rubus idaeus (red raspberry)	10	0-20	35
Rubus parviflorus (thimbleberry)	1	0-1	6
Salix bebbiana (Bebb willow)	5	0-10	18
Salix exigua (sandbar willow)	1	0-1	18
Salix lasiandra (Pacific willow)	1	0-1	6
Salix lutea (yellow willow)	3	0-3	12
Salix planifolia (planeleaf willow)	1	0-1	6
Salix pseudomonticola (mountain willow)	3	0-3	6
Salix serissima (autumn willow)	30	0-30	6
Solanum dulcamara (climbing nightshade)	1	0-1	6
Symphoricarpos albus (common snowberry)	20	0-20	6
Symphoricarpos occidentalis (western snowberry)	7	0-20	29
Symphoricarpos species (snowberry)	10	0-10	6
Toxicodendron rydbergii (poison ivy)	3	0-3	12
Graminoids			
Agropyron species (wheatgrass)	1	0-1	6
Agropyron repens (quackgrass)	17	0-40	24
Agrostis stolonifera (redtop)	14	0-60	47
Beckmannia syzigachne (American sloughgrass)	10	0-10	6
Bromus ciliatus (fringed brome)	3	0-3	6
Bromus inermis (smooth brome)	5	0-10	18
Bromus tectorum (cheatgrass)	2	0-3	12

Table 59 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Calamagrostis canadensis (bluejoint reedgrass)	20	0-20	6
Calamagrostis purpurascens (purple reedgrass)	10	0-10	6
Carex aquatilis (water sedge)	3	0-3	6
Carex bebbii (Bebb's sedge)	10	0-10	6
Carex buxbaumii (Buxbaum's sedge)	3	0-3	6
Carex capillaris (hair sedge)	10	0-10	6
Carex deweyana (Dewey's sedge)	2	0-3	12
Carex disperma (soft-leaved sedge)	3	0-3	6
Carex hoodii (Hood's sedge)	10	0-10	6
Carex interior (inland sedge)	10	0-10	6
Carex lanuginosa (woolly sedge)	1	0-1	6
Carex leptalea (bristle-stalked sedge)	20	0-20	6
Carex retrorsa (retrorse sedge)	1	0-1	6
Carex rostrata (beaked sedge)	3	0-3	12
Carex vulpinoidea (fox sedge)	3	0-3	6
Cinna latifolia (drooping woodreed)	1	0-1	6
Dactylis glomerata (orchard-grass)	1	0-1	6
Eleocharis acicularis (needle spike-rush)	1	0-1	6
Elymus glaucus (blue wildrye)	27	0-40	18
Elymus virginicus (Virginia wildrye)	1	0-1	6
Glyceria grandis (American mannagrass)	10	0-10	6
Glyceria striata (fowl mannagrass)	40	0-60	12
Juncus articulatus (jointed rush)	10	0-10	6
Juncus tenuis (slender rush)	10	0-10	6
Juncus torreyi (Torrey's rush)	10	0-10	6
Muhlenbergia asperifolia (alkali muhly)	50	0-50	6
Muhlenbergia filiformis (slender muhly)	3	0-3	6
Muhlenbergia glomerata (marsh muhly)	1	0-1	6
Phalaris arundinacea (reed canarygrass)	14	0-30	18
Phleum pratense (common timothy)	30	0-40	12
Poa palustris (fowl bluegrass)	9	0-20	29
Poa pratensis (Kentucky bluegrass)	23	0-30	18
Stipa occidentalis (western needlegrass)	20	0-20	6
Forbs			
Achillea millefolium (common yarrow)	1	0-1	6
Actaea rubra (baneberry)	1	0-1	6
Agastache foeniculum (lavender giant-hyssop)	20	0-20	6
Agastache urticifolia (nettle-leaf giant-hyssop)	1	0-1	6
Apocynum cannabinum (hemp dogbane)	2	0-3	18

Table 59 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Artemisia absinthium (common wormwood)	1	0-1	6
Aster occidentalis (western aster)	3	0-3	6
Aster subspicatus (Douglas' aster)	1	0-1	6
Centaurea maculosa (spotted knapweed)	1	0-1	6
Chrysanthemum leucanthemum (oxeye-daisy)	10	0-10	6
Cicuta maculata (spotted water-hemlock)	10	0-10	6
Cirsium arvense (Canada thistle)	3	0-10	53
Cirsium vulgare (bull thistle)	1	0-1	12
Cynoglossum officinale (common hound's-tongue)	10	0-10	6
Epilobium ciliatum (common willow-herb)	6	0-10	12
Epilobium paniculatum (autumn willow-herb)	1	0-1	6
Forb	1	0-1	6
Fragaria vesca (woods strawberry)	1	0-1	6
Fragaria virginiana (Virginia strawberry)	3	0-3	6
Galium aparine (goose-grass)	12	0-20	12
Galium boreale (northern bedstraw)	2	0-3	12
Galium triflorum (sweetscented bedstraw)	6	0-10	24
Geum macrophyllum (larged-leaved avens)	2	0-3	29
Helenium autumnale (sneezeweed)	3	0-3	6
Iris pseudacorus (yellow iris)	1	0-1	6
Lysimachia ciliata (fringed loosestrife)	20	0-20	12
Mentha arvensis (field mint)	1	0-1	6
Nepeta cataria (catnip)	1	0-1	6
Osmorhiza chilensis (mountain sweet-cicely)	6	0-10	12
Parnassia palustris (northern grass-of-parnassus)	1	0-1	6
Polygonum amphibium (water smartweed)	1	0-1	12
Potentilla flabellifolia (fan-leaf cinquefoil)	1	0-1	6
Pyrola asarifolia (pink wintergreen)	10	0-10	6
Ranunculus gmelinii (small yellow water-buttercup)	10	0-10	6
Rorippa calycina (persistent yellowcress)	1	0-1	6
Rorippa palustris (marsh yellowcress)	2	0-3	12
Rudbeckia occidentalis (black head)	10	0-10	6
Saxifraga species (saxifrage)	3	0-3	6
Sisymbrium altissimum (tumblemustard)	1	0-1	6
Smilacina racemosa (false spikenard)	1	0-1	6

Table 59 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Smilacina stellata (starry Solomon-plume)	3	0-3	24
Solidago canadensis (Canada goldenrod)	5	0-10	18
Solidago occidentalis (western goldenrod)	10	0-10	6
Solanum rostratum (buffalo bur)	3	0-3	6
Tanacetum vulgare (common tansy)	1	0-1	6
Taraxacum ceratophorum (horned dandelion)	1	0-1	6
Taraxacum officinale (common dandelion)	6	0-10	12
Thalictrum dasycarpum (purple meadowrue)	20	0-20	6
Thalictrum occidentale (western meadowrue)	3	0-3	6
Trifolium repens (white clover)	3	0-3	6
Trollius laxus (American globeflower)	3	0-3	6
Urtica dioica (stinging nettle)	9	0-20	29
Vaccaria pyramidata (cowherb)	1	0-1	6
Verbascum species (mullein)	1	0-1	6
Verbascum thapsus (common mullein)	1	0-1	12
Vicia americana (American vetch)	2	0-3	12
Viola adunca (Hook violet)	1	0-1	6
Viola species (violet)	20	0-20	6
Ferns and Allies			
Equisetum arvense (field horsetail)	3	0-3	6
Equisetum hyemale (common scouring-rush)	1	0-1	6

SOILS

Soils of the *Cornus stolonifera* (red-osier dogwood) community type are classified as Inceptisols, Entisols, or Mollisols (Padgett and others 1989). Where sites are located outside of the active floodplain, a litter/duff layer 5 cm (2 in) or more thick may accumulate. Surface horizons are comprised of a wide range of alluvial materials with textures ranging from silty clays to sandy loams. These layers may be relatively shallow or as deep as 1.5 m (5 ft) in some locations. Underlying layers are typically coarse sands, gravels and cobbles that facilitate the movement of aerated groundwater through the subsurface layers, which may be important for the longevity of stands of this type. Water availability ranges from high, where this type occupies floodplains immediately adjacent to active channels, to low on upper, remote floodplain sites where water tables may be 1 m (39 in) below the surface. Mottled and gleyed soil characteristics may be observed where near surface water tables promote oxidation/reduction reactions.

ADJACENT COMMUNITIES

On riverine systems, the *Cornus stolonifera* (red-osier dogwood) community type may border *Populus angustifolia* (narrowleaf cottonwood) forests on expansive floodplains or monotypic stands of *Phalaris arundinacea* (reed canarygrass) or sedges at the water's edge. *Pseudotsuga menziesii* (Douglas fir), *Juniperus scopulorum* (Rocky Mountain juniper), or *Populus tremuloides* (quaking aspen) may occupy adjacent sites in narrow canyon defiles. Beaver impoundments are often colonized by various willow communities interspersed with numerous other shrub types, in addition to the *Cornus stolonifera* (red-osier dogwood) community type.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production is moderate to high. Dense stands may limit access by livestock. *Cornus stolonifera* (red-osier dogwood) is considered an "ice cream" plant by livestock and wildlife and its utilization is a direct indication of past and current use levels. In some areas, livestock browsing of *Cornus stolonifera* (red-osier dogwood) may be quite high (Hansen and others 1995).

Wildlife

Cornus stolonifera (red-osier dogwood) is often eaten by moose (Costain 1989) and is heavily utilized by deer. Beaver may use it for food and building materials (Allen 1983). The dense shrub stratum provides hiding and thermal cover for small mammals and avian species.

Fisheries

Cornus stolonifera (red-osier dogwood) may function in a variety of capacities to promote stream health and enhance fisheries. It forms dense root networks that stabilize streambanks against lateral cutting and erosion, provides cover in the form of overhanging branches and banks, and shades channels, effectively moderating extreme summer temperature fluctuations. Understory species trap sediments, essentially building streambanks and filtering stream flows (Hansen and others 1995).

Fire

Cornus stolonifera (red-osier dogwood) and the associated shrub species can survive all but the most severe fires that remove duff and cause extended heating of the upper layer of soil. After a fire, the shrubs sprout from the surviving rhizomes or stolons (runners) (Fischer and Bradley 1987).

Soil Management and Rehabilitation Opportunities

Sites characterized with predominantly fine-textured soils should be avoided during periods of saturation during the spring and late fall. Coarse textured soils and high coarse fragment contents minimize most soil compaction problems associated with development. This community type is subject to recurring scouring by floods and alluvial deposition. Stands are relatively stable because of strong roots and stems. Management should emphasize the importance of *Cornus stolonifera* (red-osier dogwood) for streambank stabilization. This is particularly important on higher gradient stream channels with scouring seasonal floods (Hansen and others 1995).

For revegetation of degraded sites, *Cornus stolonifera* (red-osier dogwood) is valuable as it is readily established along stream edges by direct seeding or by transplanting rooted cuttings or nursery grown seedlings. Its rapid growth quickly stabilizes deteriorated streambanks (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

The *Cornus stolonifera* (red-osier dogwood) community type may offer excellent opportunities for viewing wildlife, but is often dense, restricting streambank access to anglers and placement of camping and picnicking sites (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Youngblood and others (1985b) described two similar community types for eastern Idaho and western Wyoming. Padgett and others (1989) described a *Cornus stolonifera* (red-osier dogwood) community type for Utah and southeastern Idaho, and Hansen and others (1995) described this type for Montana.

Crataegus douglasii Community Type
(Black Hawthorn Community Type)

CRASUC (CRSU5)
Number of Stands Sampled =25

CAUTION—Not all sites currently dominated by *Crataegus douglasii* (black hawthorn) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of

the site must match the description as presented in the Location and Associated Landform section.

NOTE—The *Crataegus douglasii* (black hawthorn) community type includes all combinations of *Crataegus douglasii* (black hawthorn) and *Crataegus succulenta* (succulent hawthorn) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Crataegus douglasii* (black hawthorn) community type is an incidental type that ranges in elevation from 1,340 to 1,727 m (4,422 to 5,700 ft.) across foothills and valleys of central and southeastern Idaho. It occurs along major stream and riverine systems, occupying islands and upper floodplains or bordering oxbows and active channels. Stands may also be located on alluvial terraces in V-shaped ravines with a variety of other vegetation types to form a complex mosaic pattern.

VEGETATION

The presence of hawthorn indicates past or present disturbance on a site. This community type, considered a grazing disclimax, is dominated by hawthorn, which is armored with sharp spines and often forms dense, impenetrable thickets that are able to withstand high grazing pressures. *Rosa woodsii* (woods rose) and *Cornus stolonifera* (red-osier dogwood) may be present in the interior of dense thickets where they are protected from browsing. Over time, physical abuse may cause stands to open, resulting in a two-layered profile with umbrelled (hawthorn in the overstory and herbaceous species such as *Poa pratensis* (Kentucky bluegrass), *Agrostis stolonifera* (redtop), *Urtica dioica* (stinging nettle), and *Arctium minus* (common burdock) dominating the understory (Table 60).

Table 60. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Crataegus douglasii* (black hawthorn) community type (number = 25 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Cornus stolonifera (red-osier dogwood)	11	0-20	32
Crataegus douglasii (black hawthorn)	46	0-98	84
Crataegus succulenta (succulent hawthorn)	52	0-98	20
Rosa woodsii (woods rose)	17	0-60	52
Symphoricarpos albus (common snowberry)	33	0-90	28
Symphoricarpos occidentalis (western snowberry)	24	0-50	28
Graminoids			
Agrostis stolonifera (redtop)	15	0-60	40
Phleum pratense (common timothy)	8	0-20	40
Poa pratensis (Kentucky bluegrass)	23	0-80	44
Forbs			
Cirsium arvense (Canada thistle)	6	0-20	32
Smilacina stellata (starry Solomon-plume)	3	0-10	32
Urtica dioica (stinging nettle)	7	0-20	28

SUCCESSIONAL INFORMATION

The *Crataegus douglasii* (black hawthorn) community type occurs on more disturbed sites along riparian corridors in a mosaic with a variety of other communities. It may act as a seral stage for *Salix lutea* (yellow willow) or *Populus tremuloides* (quaking aspen) types under these conditions. On wider floodplains, it may be associated with *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood) stands which may climax to the *Juniperus scopulorum*/*Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. Trace amounts of later seral and climax species in the immediate area may reveal the potential of a site.

SOILS

Approximately 2.5 to 5 cm (1 to 2 in) of leaf litter may accumulate over a nutrient rich surface horizon on relatively undisturbed sites above active floodplains. Upper layers may be black or brown and range in texture from silty clays to silt loams, extending to depths of 60 cm (24 in) or more. On active floodplains and other sites characterized by more frequent disturbance where a litter/duff is absent, soil textures range from silt loams to sandy loams. Fines generally dominate the underlying layers, probably throughout most of the rooting zone. Soils appear to be placed into the Entisol or Mollisol categories. Water tables were observed within 30 cm (12 in) from the surface, but may be as deep as 2 m (6.5 ft) or more for part of the year. Neither mottled nor gleyed soil features were observed in the soil profiles, although they may be present where water tables occur near the surface.

ADJACENT COMMUNITIES

Phalaris arundinacea (reed canarygrass) and cattail occupy adjacent streamside zones. *Populus trichocarpa* (black cottonwood) or *Populus angustifolia* (narrowleaf cottonwood) forests may occur as adjacent communities on broad floodplains. In riparian corridors where the *Crataegus succulenta* (succulent hawthorn) community type integrates with a diversity of other communities to form a mosaic pattern. Willows, rose, *Cornus stolonifera* (red-osier dogwood), and *Betula occidentalis* (water birch) are common on less disturbed sites. *Juniperus* *scopulorum* (Rocky Mountain juniper)/mixed grass shrublands and *Artemisia tridentata* (big sagebrush) steppe may dominate upland hillsides and plateaus.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production from dense thickets is low. Stands may be so dense as to preclude most livestock use. However, cattle will eat *Crataegus douglasii* (black hawthorn) foliage that is within reach, as well as the associated herbaceous layer. Heavy grazing and browsing pressures will cause an increase in *Rosa woodsii* (woods rose), *Symphoricarpos occidentalis* (western snowberry), and *Poa pratensis* (Kentucky bluegrass). Excessive disturbance may result in large amounts of exposed soil (Hansen and others 1995).

Wildlife

Stands of the *Crataegus douglasii* (black hawthorn) community type have a high structural diversity, providing both thermal and hiding cover for deer and moose. Numerous trails can be observed in most stands. This community type also supports a rich bird population even during the winter. Berries of *Crataegus douglasii* (black hawthorn) dry on the twigs and supply food for birds and small mammals. The characteristic branching of *Crataegus douglasii* (black hawthorn) is especially attractive for cover and as nesting sites for birds such as magpies and thrushes. Upland game birds such as grouse and pheasants frequently use this community type (Hansen and others 1995).

Fire

Crataegus douglasii (black hawthorn) is fire tolerant. The species has a shallow and much branched rhizomatous root system that will sprout and sucker following removal of the above ground stems (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The sprouting capability of *Crataegus douglasii* (black hawthorn), along with the strongly rhizomatous nature of many of the associated species makes the *Crataegus succulenta* (succulent hawthorn) community type an excellent soil stabilizer (Hansen and others 1995). However, fine textured soils may be subject to compaction when saturated during the spring run-off and should be avoided where possible.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

In terms of recreation, nature trails should be routed around dense stands of this community type. However, *Crataegus douglasii* (black hawthorn) may be valuable for planting in recreation areas as a biological barrier to protect physical structures, fragile natural areas, and to direct foot traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

A similar type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

Prunus virginiana Community Type
(Common Chokecherry Community Type)

PRUVIR (PRVI)
Number of Stands Sampled = 33

LOCATION AND ASSOCIATED LANDFORMS

The *Prunus virginiana* (common chokecherry) community type is a minor type throughout southcentral and eastern Idaho, ranging in elevation from 1,000 to 1,950 m (3,300 to 6,435 ft). Stands may be located on side slopes of hillsides immediately below springs and seeps, on the upper terraces of V-shaped canyon drainages and on wide floodplains of riverine systems. *Prunus virginiana* (common chokecherry) is commonly associated with rocky outcrops and boulder/rock fields. It generally occupies riparian zones with a variety of other communities, creating a patchwork matrix of individual species dominating microsites.

VEGETATION

Prunus virginiana (common choke-cherry) forms dense, monotypic stands upwards of 3.5 m (12 ft) in height. Standing deadwood is common on longer-lived stands. The full canopy tends to limit the presence of other shrub species and often results in a sparse herbaceous layer. *Smilacina stellata* (starry Solomon-plume) seems to be one of the few understory species that thrives under these conditions. Stands may become more open with livestock utilization, resulting in a greater diversity of shrubs, such as *Rosa woodsii* (woods rose) and *Symphoricarpos occidentalis* (western snowberry). The herbaceous layer generally reflects the level and type of disturbance on a site, and may include a diversity of disturbance-induced species such as *Poa pratensis* (Kentucky bluegrass), *Bromus* species (brome), *Urtica dioica* (stinging nettle), and *Galium* species (bedstraw) (Table 61).

Table 61. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Prunus virginiana* (common choke-cherry) community type (number = 33 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Clematis ligusticifolia (western virgins-bower)	11	0-60	27
Prunus virginiana (common chokecherry)	61	1-98	100
Ribes odoratum (buffalo currant)	10	0-80	27
Rosa woodsii (woods rose)	11	0-60	64
Symphoricarpos occidentalis (western snowberry)	15	0-50	55
Graminoids			
Poa pratensis (Kentucky bluegrass)	25	0-60	33
Forbs			
Smilacina stellata (starry Solomon-plume)	9	0-30	52
Taraxacum officinale (common dandelion)	2	0-10	30
Urtica dioica (stinging nettle)	3	0-10	36

SUCCESSIONAL INFORMATION

The *Prunus virginiana* (common chokecherry) community type often occurs in riparian zones as irregular dense thickets or bands with a complex of other vegetation communities. Successional trends may be difficult to predict because of this pattern. *Salix lutea* (yellow willow) types or *Populus tremuloides* (quaking aspen) types may represent the successional climax in these cases. *Prunus virginiana* (common chokecherry) may be a seral stage within the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type as well but could actually represent a grazing disclimax under certain circumstances (Hansen and others 1995). On slightly drier sites, the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Pseudotsuga menziesii/Cornus stolonifera* (Douglas fir/red-osier dogwood) habitat type may develop as the final successional stage. The vegetative potential of a site is dependent on physical site features and the presence of later successional/climax species; both factors should be considered when determining the successional direction of a site.

SOILS

Hansen and others (1995) indicate that this type may prefer well-drained, older, more developed soils that afford good rooting depth and higher fertility, generally classified as Entisols (Torrifluvents) and Mollisols (Haploborolls and Argiborolls). Surface horizons are characterized by a rich, organic component that is fed by an overlying litter/duff layer up to 7.5 cm (3 in) thick. Soil textures are generally silty loams or silt clay loams and may be 60 cm (24 in) or more deep. Underlying substrates are composed of rock and sand, although fines may be present to a depth of 1 m (39 in) or more in some locales. Water tables are generally at least 1 m (39 in) below the surface. The *Prunus virginiana* (common chokecherry) community type appears unable to tolerate prolonged or frequent flooding.

ADJACENT COMMUNITIES

Betula occidentalis (water birch), *Cornus stolonifera* (red-osier dogwood), and willow communities often occur in conjunction with the *Prunus virginiana* (common chokecherry) community type in wetter portions of the riparian zone. *Rhus aromatica* (fragrant sumac), *Rosa* species (rose), and *Ribes odoratum* (buffalo currant) are more common on drier sites. Sedge is typically present along adjacent streambanks in saturated zones, and cottonwoods may occupy adjacent, broader floodplains. Conifers, such as *Pseudotsuga menziesii* (Douglas fir) or *Juniperus scopulorum* (Rocky Mountain juniper), may develop in the riparian zone or on drier hillsides. *Artemisia tridentata* (big sagebrush)/grasslands occur on adjacent uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

In dense, monotypic stands, forage production from the *Prunus virginiana* (common chokecherry) community type is low. The palatability of *Prunus virginiana* (common chokecherry) ranges from poor to fair for both cattle and sheep, although livestock losses due to poisoning sometimes occur. Livestock normally do not eat fatal quantities except when other forage is scarce (Wasser 1982, Johnson and Nichols 1982).

Over the years, there has been some debate whether *Prunus virginiana* (common chokecherry) leaves are poisonous to livestock. The leaves and seeds do have sugars that contain cyanide. These cyanide sugars are not poisonous themselves, but when plant material is crushed, eaten or decomposed, enzymes cause hydrogen cyanide to be released. In high concentrations, hydrogen cyanide is a metabolic poison to most animals, including humans. It has recently been shown that livestock can acquire the ability to detoxify hydrogen cyanide if they consume limited amounts of it over an extended period. Therefore, *Prunus virginiana* (common chokecherry) will poison livestock only if it is consumed in large amounts without prior exposure (Hansen and others 1995).

Wildlife
The moderate structural diversity of the *Prunus virginiana* (common chokecherry) community type provides thermal and hiding cover for livestock, big game, and upland bird species. *Prunus virginiana* (common chokecherry) rates fair to good as palatable browse for big game. In some instances, dwarfed and thinned communities can occur as the result of concentrations of game in winter. As stands open and herbaceous species establish due to increasing disturbance, the forage value for both livestock and wildlife increases accordingly. *Prunus virginiana* (common chokecherry) is moderately tolerant of browsing (Hansen and others 1995).

Prunus virginiana (common chokecherry) is among one of our most important wildlife food plants. The fruits are relished by both birds and mammals. The leaves and twigs of *Prunus virginiana* (common chokecherry) are also nutritious for browsing animals, and this shrub is rated as one of the best sources of winter browse for deer and elk. This is due to the increase of protein content in the stems during the fall and winter. The leaves and stems are also higher in carbohydrates, calcium, and phosphorus than other native shrubs (Hansen and others 1995).

Fisheries
Prunus virginiana (common chokecherry) is an excellent shrub for providing thermal cover for fish and for controlling erosion along streams (Hansen and others 1995).

Fire
Prunus virginiana (common chokecherry) will survive all but a hot, intense fire. *Prunus virginiana* (common chokecherry) has an aggressive root system and vigorously sprouts from surviving root crowns after fire (or occasionally from rhizomes) (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Disturbed areas can be revegetated with *Prunus virginiana* (common chokecherry) with nursery-grown stock or rooted cuttings. Adapted to a wide variety of sites, transplant success rates are typically high (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
The fruit of *Prunus virginiana* (common chokecherry) is highly regarded for making wine and tasty jelly, but one must harvest ahead of the birds (Johnson and Nichols 1982). Indians ate the fruit fresh or preserved it by drying. In addition, they combined it with venison and buffalo meat to make mincemeat. They also used the berries for medicinal purposes.

Because of the density of branches, twigs, and heavy foliage, communities dominated by *Prunus virginiana* (common chokecherry) provide excellent screens in recreation areas. Because of their fruits, they also provide excellent opportunities for viewing a variety of wildlife (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented for Montana in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

Rhus aromatica Community Type
(Fragrant Sumac Community Type)

RHUARO (RHAR)
Number of Stands Sampled = 12

CAUTION—Not all sites currently dominated by *Rhus aromatica* (fragrant sumac) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Rhus aromatica* (fragrant or skunk-bush sumac) community type is an incidental type at low to mid elevations of southern Idaho. It occupies marginally riparian sites, and is typically found on drier alluvial terraces along stream and river bottoms. Stands are also located in V-shaped ravines, swale-like depressions, or on hillsides immediately adjacent to springs or seeps. Sites range in elevation from 787 to 1,667 m (2,600 to 5,500 ft).

VEGETATION

Rhus aromatica (fragrant sumac) is a native, low growing shrub up to 2 m (6-7 ft) tall (Hitchcock and Cronquist 1973). It is densely branched and forms compact, monotypic thickets, which are nearly impenetrable. Its crown diameter is often greater than its height, reaching widths of 9 m (30 ft) in extreme cases. This community is considered a grazing disclimax. Under heavy grazing pressures, stands may develop more open canopies, allowing the intrusion of *Rosa* species (rose), and *Ribes odoratum* (buffalo currant). *Artemisia tridentata* (big sagebrush) may be interspersed throughout stands but generally occupies drier adjacent upland sites. Ground cover of the stand interior is quite diverse. Some sites may be blanketed with a thick litter/duff layer of twigs and leaves, essentially devoid of an herbaceous component. Other sites may host a dense understory element of various graminoids and forbs, dominated by *Bromus tectorum* (cheatgrass), *Agropyron smithii* (western wheatgrass), *Elymus cinereus* (basin wildrye), and/or *Poa pratensis* (Kentucky bluegrass) (Table 62). The levels and types of disturbances influence the understory composition and density.

Table 62. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Rhus aromatica* (fragrant sumac) community type (number = 12 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Clematis ligusticifolia (western virgins-bower)	5	0-10	25
Rhus aromatica (fragrant sumac)	97	90-98	100
Ribes odoratum (buffalo currant)	3	0-3	42
Rosa woodsii (woods rose)	5	0-10	67
Graminoids			
Bromus tectorum (cheatgrass)	16	1-60	100
Forbs			
Cirsium arvense (Canada thistle)	2	0-3	42
Galium aparine (goose-grass)	37	0-70	25
Lactuca serriola (prickly lettuce)	2	0-3	25
Nepeta cataria (catnip)	3	0-3	33
Urtica dioica (stinging nettle)	2	0-3	67

SUCCESSIONAL INFORMATION

The *Rhus aromatica* (fragrant sumac) community type occupies a similar position on the landscape as does the *Rosa woodsii* (woods rose) community type, dominating drier riparian zones. In steep drainages where floodplains are narrow and the transition from wetland to upland zones is abrupt, types in the *Salix lutea* (yellow willow) series may represent the climax vegetation. On drier sites, *Rhus aromatica* (fragrant sumac) may represent a seral stage for the *Juniperus scopulorum*/*Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type or the *Juniperus osteosperma*/*Cornus stolonifera* (Utah juniper/red-osier dogwood) habitat type. Padgett and others (1989) suggest that a *Populus angustifolia*/*Rhus aromatica* (narrowleaf cottonwood/fragrant sumac) community type in Utah may be successional to certain upland types.

SOILS

Soils of this type may possess a xeric moisture regime and are usually classified as Entisols and Inceptisols, although Mollisols may be present on some locations (Padgett and others 1989). Sandy loams and silt loams are common at the surface. The depths of these upper horizons vary considerably from site to site, and may form only shallow skins or irregular pockets over rocks and between boulders in some locations, while reaching depths of 1 m (39 in) or more in others. Alluvial cobbles, gravels, and sands often dominate underlying layers, with an inconsistent rock and/or boulder component. Twig and leaf litter layers are common as ground cover, and may be in excess of 10 cm (4 in) thick on some sites. *Rhus aromatica* (fragrant sumac) is intolerant of high water tables and prolonged flooding. Water tables at or near the surface during spring run-off can drop below 2 m (6.6 ft) during the late summer.

ADJACENT COMMUNITIES

Phragmites australis (common reed), sedges, and *Salix exigua* (sandbar willow) are present immediately adjacent to active channels. *Salix lutea* (yellow willow) dominated habitat types or the *Cornus stolonifera* (red-osier dogwood) community type may occupy nearby moist sites in riparian zones. *Ribes* (currant) and *Rosa* species (rose) communities are common on similar, slightly drier zones. Adjacent upland communities are typically dominated by *Artemisia tridentata* (big sagebrush) steppe and *Juniperus scopulorum* (Rocky Mountain juniper)/mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production from dense thickets of the *Rhus aromatica* (fragrant sumac) community type is low. Stands may be so dense as to exclude most livestock use. It is rated fair in energy value and poor in protein value for livestock, although the fruits are reported to provide a good source of vitamin A during the winter months. (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999). Mueggler and Stewart (1980) reported that in Montana, continued livestock overgrazing could cause *Rhus aromatica* (fragrant sumac) to increase, although winter overuse by big game often causes it to decrease. Nevertheless, in arid regions where palatable species are scarce, *Rhus aromatica* (fragrant sumac) may represent some of the only forage available and may be browsed heavily (Sampson and Jespersen 1963).

Wildlife

Rhus aromatica (fragrant sumac) is reported to be an important summer food source for mule deer in the Missouri Breaks of Montana, and provides some browse for deer, elk, and pronghorn when other more preferred forage is unavailable. (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999). In most locations, big game use tends to be heaviest during the winter when food supplies are most limited.

The leaves and twigs of *Rhus aromatica* (fragrant sumac) are browsed by rabbits in many areas, and to a more limited extent by porcupines in the North Dakota Badlands (Sanford 1970). Because the fruit of *Rhus aromatica* (fragrant sumac) persists through the fall and winter, this species can provide a ready food source for birds and small mammals when other foods are scarce or unavailable. Wild turkey, pheasant, sage grouse, ruffed grouse, quail, and various songbirds forage on *Rhus aromatica* (fragrant sumac) berries. Squirrels, mice, and other small mammals also consume large quantities of the fruit (Stanton 1974).

Fire

Rhus aromatica (fragrant sumac) is fire tolerant, except for smoldering fires with heavy volumes of surface fuel. This species generally sprouts vigorously from the root crown and rhizomes following fire, and crown widths and overall coverages often increase in response to fire treatment. *Rhus aromatica* (fragrant sumac) may have the ability to delay sprouting for up to one year following fire. This adaptation may significantly enhance survival in some harsh environments (Sanford 1970).

Although vegetative reproduction is the primary mode of reestablishment after fire, *Rhus aromatica* (fragrant sumac) may also reproduce through seed. Evidence suggests that some species of *Rhus* are effective seed banks, with seed stored in the humus layer which germinate when fire creates conditions favorable for growth. However, at present, this strategy has not been verified for *Rhus aromatica* (fragrant sumac)(USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Soil Management and Rehabilitation Opportunities

Rhus aromatica (fragrant sumac) is a sprouting species with a shallow and much branched rhizomatous root system. This not only makes it a good soil stabilizer and allows it to colonize large areas, but also permits it to actually increase overall coverage after a fire. *Rhus aromatica* (fragrant sumac) is valuable for revegetating disturbed sites along streambanks and seeps, but has low potential for short-term revegetation and should be considered on a long-term basis. This low-maintenance species may have value for erosion control and dune stabilization and has been used for roadside plantings and on phosphate mine spoils in Idaho (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Rhus aromatica (fragrant sumac) can be readily propagated from root cuttings and transplanted onto disturbed sites. Properly treated seed can be planted in the fall without stratification or in the spring if the seed is treated and then stratified before planting (Stanton 1974). However, fall and winter plantings produce the best results. The presence of seeded grasses has reduced the survival of *Rhus aromatica* (fragrant sumac) at some sites (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Native Americans valued *Rhus aromatica* (fragrant sumac) and made use of the fruit, twigs, leaves, and shoots. The fruits were used in foods and medicines, and in the preparation of lemonade-like beverages. Pliable young stems were woven into durable baskets, and the leaves were smoked by the Comanches. *Rhus aromatica* (fragrant sumac) was also used in making dyes for clothing (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999).

Rhus aromatica (fragrant sumac), first cultivated in 1877, has been used as an ornamental and for windbreaks and shelterbelts. It has been widely planted at recreation sites and rest areas and is useful as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hassell 1982).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Padgett and others (1989) describe a *Populus angustifolia/Rhus aromatica* (narrowleaf cottonwood/ fragrant sumac) community type in Utah with cottonwoods dominating the overstory. Manning and others (1992) describe a similar *Populus/Rhus aromatica* (cottonwood/fragrant sumac) community type in Nevada and eastern California. However, no communities dominated solely by this shrub have been described elsewhere.

Rosa woodsii Community Type (Woods Rose Community Type)

ROSWOO (ROWO)
Number of Stands Sampled = 26

CAUTION—Not all sites currently dominated by *Rosa woodsii* (woods rose) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

NOTE: The *Rosa woodsii* (woods rose) community type includes all combinations of *Rosa woodsii* (woods rose) and *Rosa acicularis* (prickly rose) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Rosa woodsii* (woods rose) community type is an incidental type across hillsides and valleys of southcentral and eastern Idaho. It occurs as dense thickets on alluvial floodplain terraces adjacent to streams and rivers of V-shaped canyons. Stands are also located on the side slopes of hillsides immediately below springs and seeps or on upper floodplains of broad, level drainages. Sites range in elevation from 1,091 to 2,060 m (3,600 to 6,800 ft).

VEGETATION

The *Rosa woodsii* (woods rose) community type represents a grazing disclimax in Idaho. Stands are often dense and may be nearly impenetrable due to thorns on the stems and branches. This type is often comprised of an assortment of other minor shrub species scattered throughout the stand in addition to the predominant *Rosa woodsii* (woods rose). These species include: *Ribes odoratum* (buffalo currant), *Ribes setosum* (Missouri gooseberry), and *Artemisia tridentata* (big sagebrush). Herbaceous species are quite diverse and are generally represented by disturbance-induced and weedy types such as *Poa pratensis* (Kentucky bluegrass), *Cirsium arvense* (Canada thistle), and *Urtica dioica* (stinging nettle) (Table 63).

Table 63. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Rosa woodsii* (woods rose) community type (number = 26 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Rosa acicularis (prickly rose)	10	0-10	4
Rosa woodsii (woods rose)	45	0-98	96
Graminoids			
Agrostis stolonifera (redtop)	7	0-20	27
Elymus cinereus (basin wildrye)	19	0-60	31
Juncus balticus (Baltic rush)	9	0-40	35
Phleum pratense (common timothy)	19	0-40	35
Poa pratensis (Kentucky bluegrass)	28	0-60	77
Forbs			
Achillea millefolium (common yarrow)	4	0-10	35
Cirsium arvense (Canada thistle)	8	0-40	58
Galium boreale (northern bedstraw)	8	0-30	27
Solidago canadensis (Canada goldenrod)	14	0-40	31
Taraxacum officinale (common dandelion)	2	0-3	31
Urtica dioica (stinging nettle)	3	0-10	38

SUCCESSIONAL INFORMATION

The *Rosa woodsii* (woods rose) community type plays the role of the generalist, growing on a range of disturbed sites and representing a mid-seral grazing disclimax for a variety of willow types. With the absence of utilization, it may in turn act as a successional sere for these same willow communities. The *Juniperus scopulorum*/*Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type probably represents the climax vegetation on drier riparian sites. In moist, alpine environments, *Populus tremuloides* (quaking aspen) forms the final stage of succession. *Rosa woodsii* (woods rose) is often one of the first species to invade an upland site that has acquired greater soil moisture because of beaver activity or channel migration. Hansen and others (1995) indicate that careful observation of site characteristics and remnant plant species will assist in the determination of the site potential.

SOILS

Manning and Padgett (1992) indicate that this community type occupies soils classified as Inceptisols, Entisols, or on sites with greater soil development, Mollisols. Surface horizons may be 75 cm (30 in) or more deep with textures ranging from silty clays to sandy loams. Gravels, cobbles, and rocks are common in deeper horizons. Leaf and twig litter can accumulate to depths of 10 cm (4 in) in extreme cases, and form extensive coverage on less disturbed sites. Wasser (1982) notes that the *Rosa woodsii* (woods rose) community type is intolerant of poor drainage, high water tables, and prolonged flooding, although Manning and Padgett (1992) observed mottles on some sites in Nevada, indicative of seasonally shallow water tables. This disturbance community type may be capable of establishing over a range of sites with variable substrates and moisture regimes.

ADJACENT COMMUNITIES

Sedges, *Eleocharis* species (spike-rush) and *Juncus balticus* (Baltic rush) inhabit saturated sites along streambanks and active channels. Willows, *Betula occidentalis* (water birch), *Ribes odoratum* (buffalo currant), and *Cornus stolonifera* (red-osier dogwood) may occupy adjacent sites in riparian corridors where grazing is less severe. Neighboring upland communities are predominantly *Artemisia tridentata* (big sagebrush) shrubland, and mixed grasslands with *Juniperus scopulorum* (Rocky Mountain juniper) sporadically interspersed.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Rosa woodsii (woods rose) is considered fair to fairly good as forage for livestock, particularly sheep (Johnson and Nichols 1982). Literature indicates that the protein, calcium, and phosphorus levels of *Rosa woodsii* (woods rose) are sufficient for maintenance requirements of sheep and cattle throughout most of the year (USDA Forest Service Intermountain Research Station's Fire Sciences Laboratory 1999). However, forage production from dense thickets of the *Rosa woodsii* (woods rose) community type may be low where shrubs become impenetrable.

Wildlife

Stands of the *Rosa woodsii* (woods rose) community type provide good structural diversity for both thermal and hiding cover. Deer and elk may browse heavily on *Rosa woodsii* (woods rose), while the persistent fruit (rose hips) provides fall and winter food for birds, small mammals, and bears, which disperse the seeds. *Rosa woodsii* (woods rose) is strongly grazing tolerant but can be dwarfed and thinned by intense browsing or defoliation by season long use (Hansen and others 1995).

Fire

Rosa woodsii (woods rose) is strongly fire tolerant, except for smoldering fires with heavy volumes of surface fuel. The species has a shallow and much branched rhizomatous root system that will readily sprout and sucker. This sprouting capability of *Rosa woodsii* (woods rose) makes it a good soil stabilizer. This is especially important given the severe disturbance common to areas colonized by this community type (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Rosa woodsii (woods rose) is valuable for revegetating disturbed sites along streambanks and seeps. It is easily established from nursery-grown stock, root cuttings, or transplanted materials (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Native Americans made extensive use of *Rosa woodsii* (woods rose) roots, stems, leaves, flowers, and rose hips for food and therapeutic materials (US Forest Service 1975). The persistent rose hips are edible, and are one of the best natural sources of vitamin C. They can be dried for use in flavoring teas, jellies, fruitcakes, and puddings.

Nature trails should be routed around dense stands of *Rosa woodsii* (woods rose) community type. However, *Rosa woodsii* (woods rose) is useful for planting in recreation areas as a biological barrier to protect physical structures, young and delicate plants, and to direct traffic (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

This type has been documented in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995). Manning and Padgett (1992) have also described this type for Nevada and eastern California.

Symphoricarpos occidentalis Community Type (Western Snowberry Community Type)

SYMOCC (SYOC)
Number of Stands Sampled = 5

CAUTION—Not all sites currently dominated by *Symphoricarpos occidentalis* (western snowberry) are considered riparian or wetland sites. In some instances, they are considered upland sites. The topographic position of the site must match the description as presented in the Location and Associated Landform section.

LOCATION AND ASSOCIATED LANDFORMS

The *Symphoricarpos occidentalis* (western snowberry) community type is an incidental type at mid elevations in central and southeastern Idaho. Sites range from 1,637 to 2,030 m (5,400 to 6,700 ft). It typically occurs on upper, alluvial terraces along streams and rivers, but may be located on hillsides immediately below springs or seeps.

VEGETATION

Both *Symphoricarpos occidentalis* (western snowberry) and *Symphoricarpos albus* (common snowberry) occur within this community type, although typically, only one species is actually present. The *Symphoricarpos occidentalis* (western snowberry) community type tolerates direct sunlight and forms dense thickets because of many-branched, spreading rhizomatous root systems. Large, dense patches often exclude other forms of vegetation; however, with disturbance, a variety of other shrub species becomes associated with it. Shrubs found on site include *Rosa woodsii* (woods rose), *Prunus virginiana* (common chokecherry), *Amelanchier alnifolia* (western serviceberry), and *Artemisia tridentata* (big sagebrush). Understory graminoids and forbs may include *Poa pratensis* (Kentucky bluegrass), *Bromus inermis* (smooth brome), *Solidago canadensis* (Canada goldenrod), and *Geranium viscosissimum* (sticky geranium) (Table 64).

Table 64. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more disturbed and/or early to mid-seral stands of the *Symphoricarpos occidentalis* (western snowberry) community type (number = 5 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Rosa woodsii (woods rose)	4	0-10	60
Symphoricarpos albus (common snowberry)	21	0-30	60
Symphoricarpos occidentalis (western snowberry)	30	0-30	20
Symphoricarpos species (snowberry)	20	0-20	20
Graminoids			
Bromus carinatus (mountain brome)	10	0-10	40
Elymus cinereus (basin wildrye)	11	0-20	40
Muhlenbergia asperifolia (alkali muhly)	1	0-1	40
Phleum pratense (common timothy)	7	0-10	40
Poa pratensis (Kentucky bluegrass)	48	0-60	80
Forbs			
Achillea millefolium (common yarrow)	1	0-1	60
Aster occidentalis (western aster)	1	0-1	40
Campanula rotundifolia (lady's-thimble)	1	0-1	40
Cirsium arvense (Canada thistle)	1	0-1	40
Fragaria virginiana (Virginia strawberry)	1	0-1	40
Geranium viscosissimum (sticky geranium)	2	0-3	80
Heracleum lanatum (cow-parsnip)	1	0-1	40
Potentilla gracilis (slender cinquefoil)	1	0-1	40
Solidago canadensis (Canada goldenrod)	9	0-20	80
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	21	0-40	40

SUCCESSIONAL INFORMATION

The *Symphoricarpos occidentalis* (western snowberry) community type generally represents a mid-seral, grazing induced, successional stage of the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type or the *Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain juniper/red-osier dogwood) habitat type. At other locations, the *Symphoricarpos occidentalis* (western snowberry) community type seems to represent a long-lived, mid-seral stage that was not influenced by heavy grazing pressures. Future work may bring insight into the ecological status of this community type.

SOILS

Hansen and others (1995) indicate that soils are quite variable and include Entisols (Torrifluvents), and Mollisols (Haploborolls, and Argiborolls). The *Symphoricarpos occidentalis* (western snowberry) community type occurs on virtually all soil textures except sand. This community type is also tolerant of imperfectly drained soils and short duration floods, but is intolerant of prolonged floods and permanent high water tables. Soil reaction ranges between slightly acid to mildly alkaline (pH 6.0 to 8.0) (Wasser 1982).

ADJACENT COMMUNITIES

The *Symphoricarpos occidentalis* (western snowberry) community type may be associated with a mosaic of other shrub and tree communities along riparian corridors and across broad level floodplains. Adjacent wetter communities are dominated by various willows, cottonwood, or the *Acer negundo/Cornus stolonifera* (box-elder/red-osier dogwood) habitat type. Drier communities include *Rosa woodsii* (woods rose) and *Crataegus douglasii* (black hawthorn). *Juniperus scopulorum* (Rocky Mountain juniper)/mixed grass shrublands and *Artemisia tridentata* (big sagebrush) occupy the adjacent uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Forage production for dense, monotypic stands is low. As stands open, forage production increases accordingly due to the presence of *Agropyron smithii* (western wheatgrass) and *Poa pratensis* (Kentucky bluegrass). The palatability of *Symphoricarpos occidentalis* (western snowberry) ranges from low to fair for cattle and sheep (Wasser 1982, Johnson and Nichols 1982).

Wildlife

The moderate structural diversity of the *Symphoricarpos occidentalis* (western snowberry) community type provides thermal and hiding cover for big game and upland bird species. The palatability of *Symphoricarpos occidentalis* (western snowberry) is rated as good for deer and elk (Wasser 1982, Johnson and Nichols 1982).

Fisheries

This community type offers excellent streambank stabilization due to the rhizomatous nature of *Symphoricarpos occidentalis* (western snowberry) (Hansen and others 1995).

Fire

Symphoricarpos occidentalis (western snowberry) is tolerant of fire, and usually sprouts, with stands becoming denser after disturbance. However, it is such a strong competitor, particularly in dense colonies, that it is not compatible with most herbaceous vegetation (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Symphoricarpos occidentalis (western snowberry) is well adapted for revegetating sites. Commonly growing in dense colony stands makes it suitable for disturbed land stabilization. It does best on moist, well-drained soils which have not been excessively disturbed. Once established, it grows at a moderate rate and spreads rapidly by root sprouts. Nursery grown seedlings, rooted cuttings, or wildlings are the preferred planting materials. Critical, erosive sites may need complete exclusion from grazing during establishment, and animal populations and stacking rates should be balanced with forage supply on noncritical sites after establishment (Wasser 1982).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations

Recreational opportunities are good to excellent for both big game and upland bird hunting. Because the fruits persist into the winter, *Symphoricarpos occidentalis* (western snowberry) is an important food source for upland birds.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate “type(s)” that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = scrub-shrub; Subclass = broad-leaved deciduous; Water Regime (nontidal) = temporarily flooded to intermittently flooded.

OTHER STUDIES

Similar communities have been described for Minnesota (Pelton 1953) and the northern Great Plains (Hansen and others 1984, Hansen and Hoffman 1988, Hansen and others 1995).

Carex aquatilis Habitat Type (Water Sedge Habitat Type)

CARAQU (CAAQ)
Number of Stands Sampled = 42

LOCATION AND ASSOCIATED LANDFORMS

The *Carex aquatilis* (water sedge) habitat type is an incidental type throughout southeastern Idaho. Sites range in elevation from 1,515 to 1,697 m (5,000 to 5,600 ft). It occurs on broad, flat benches or valley bottoms immediately adjacent to open water. This habitat type may grade into the *Carex rostrata* (beaked sedge) habitat type on sites characterized by slightly deeper water where *Carex aquatilis* (water sedge) is less competitive. Similar to the *Carex rostrata* (beaked sedge) habitat type, sites dominated by *Carex aquatilis* (water sedge) also include silted in beaver ponds, old oxbow lakes, depressions left by migrating stream channels, and narrow floodplains adjacent to small streams.

VEGETATION

Carex aquatilis (water sedge) is the diagnostic species for this habitat type. Its rhizomatous root network forms a dense mat, often precluding the establishment of competing graminoids and forbs and resulting in a monoculture on some sites. Other herbaceous species that may be present on less homogeneous stands, generally characterized by low coverages and constancies, may include: *Deschampsia cespitosa* (tufted hairgrass), *Juncus regelii* (Regel's rush), and other assorted sedges (Table 65).

Table 65. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex aquatilis* (water sedge) habitat type (number = 20 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	1	0-1	10
Salix bebbiana (Bebb willow)	3	0-3	10
Salix boothii (Booth willow)	2	0-3	15
Salix drummondiana (Drummond willow)	1	0-1	5
Salix geyeriana (Geyer willow)	2	0-3	20
Salix lasiandra (Pacific willow)	3	0-3	5
Salix planifolia (planeleaf willow)	2	0-3	15
Graminoids			
Agrostis humilis (Alpine bentgrass)	1	0-1	5
Alopecurus alpinus (alpine foxtail)	1	0-1	5
Beckmannia syzigachne (American sloughgrass)	1	0-1	5
Calamagrostis stricta (narrow-spiked reedgrass)	2	0-3	20
Carex aquatilis (water sedge)	62	30-90	100
Carex canescens (gray sedge)	2	0-3	10
Carex diandra (lesser-panicled sedge)	3	0-3	5
Carex species (sedges)	1	0-1	5
Carex illota (sheep sedge)	1	0-1	5
Carex rostrata (beaked sedge)	15	0-20	20
Carex saxatilis (Russet sedge)	30	0-30	5
Carex simulata (short-beaked sedge)	30	0-60	15
Carex vesicaria (inflated sedge)	20	0-20	10
Deschampsia cespitosa (tufted hairgrass)	20	0-60	45
Eleocharis palustris (common spikesedge)	3	0-3	5
Glyceria striata (fowl mannagrass)	1	0-1	5
Hordeum brachyantherum (meadow barley)	1	0-1	5
Juncus balticus (Baltic rush)	1	0-1	5
Juncus regelii (Regel's rush)	10	0-10	5
Phleum alpinum (alpine timothy)	1	0-1	10
Poa cusickii (Cusick's bluegrass)	1	0-1	5
Poa palustris (fowl bluegrass)	11	0-20	10
Forbs			
Achillea millefolium (common yarrow)	1	0-1	5
Aster occidentalis (western aster)	1	0-1	20
Caltha leptosepala (elkslip marshmarigold)	3	0-3	5
Dodecatheon pulchellum (few-flowered shooting star)	1	0-1	5
Epilobium ciliatum (common willow-herb)	1	0-1	10
Epilobium species (willow-herb)	1	0-1	5
Epilobium palustre (swamp willow-herb)	2	0-3	10
Erigeron peregrinus (subalpine daisy)	1	0-1	5
Galium trifidum (small bedstraw)	1	0-1	10
Geum macrophyllum (larged-leaved avens)	1	0-1	15
Mentha arvensis (field mint)	3	0-3	10
Pedicularis groenlandica (elephant's head)	3	0-3	5
Polygonum amphibium (water smartweed)	1	0-1	5
Polemonium occidentale (western polemonium)	1	0-1	10
Potentilla species (cinquefoil)	3	0-3	5
Potentilla gracilis (slender cinquefoil)	3	0-10	20

Table 65 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Ranunculus natans (floating water-buttercup)	3	0-3	5
Senecio cymbalarioides (few-leaved groundsel)	1	0-1	5
Senecio hydrophilus (alkali-marsh butterweed)	1	0-1	10
Senecio integerrimus (western groundsel)	1	0-1	5
Sium suave (hemlock water-parsnip)	1	0-1	5
Stellaria longipes (longstalk starwort)	1	0-1	15
Swertia perennis (swertia)	10	0-10	5
Taraxacum officinale (common dandelion)	1	0-1	5
Viola species (violet)	1	0-1	10

SUCCESSIONAL INFORMATION

Carex aquatilis (water sedge) functions both as a pioneer colonizer of exposed mineral substrates, such as those resulting with the collapse of beaver dams or from alluvial transport, and as a climax species. High water tables and the vigorous root network characteristic of *Carex aquatilis* (water sedge) limit the successful establishment of most other species. In general, the high water tables throughout the growing season tend to limit access by livestock. However, due to the palatable nature of *Carex aquatilis* (water sedge), severe grazing pressures can greatly decrease its cover while increasing the cover of disturbance-caused herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Juncus balticus* (Baltic rush), *Taraxacum officinale* (common dandelion), *Geum macrophyllum* (large-leaved avens), and *Poa pratensis* (Kentucky bluegrass) (Table 66). Species compositions and coverages can often indicate the levels and period of disturbance particular to different sites.

Table 66. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Carex aquatilis* (water sedge) habitat type (number = 22 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Picea species (spruce)	1	0-1	5
Shrubs			
Betula glandulosa (bog birch)	1	0-1	9
Lonicera involucrata (twin-berry)	3	0-3	5
Potentilla fruticosa (shrubby cinquefoil)	1	0-3	27
Rosa woodsii (woods rose)	1	0-1	5
Salix candida (hoary willow)	3	0-3	5
Salix geyeriana (Geyer willow)	3	0-3	5
Salix lutea (yellow willow)	1	0-1	5
Salix planifolia (planeleaf willow)	2	0-3	9
Salix wolfii (Wolf's willow)	2	0-3	18
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	5
Agrostis stolonifera (redtop)	1	0-1	5
Alopecurus alpinus (alpine foxtail)	1	0-1	9
Bromus ciliatus (fringed brome)	1	0-1	14
Calamagrostis canadensis (bluejoint reedgrass)	3	0-3	5
Calamagrostis stricta (narrow-spiked reedgrass)	13	0-40	32
Carex aquatilis (water sedge)	45	20-80	100
Carex crawei (Craw's sedge)	3	0-3	5
Carex species (sedges)	3	0-3	5
Carex lanuginosa (woolly sedge)	1	0-1	5
Carex leptalea (bristle-stalked sedge)	3	0-3	5
Carex microptera (small-winged sedge)	11	0-20	9
Carex nebrascensis (Nebraska sedge)	21	0-40	9
Carex pachystachya (thick-headed sedge)	10	0-10	5
Carex praegracilis (clustered field sedge)	1	0-1	9
Carex rostrata (beaked sedge)	4	0-20	45
Carex scopulorum (Holm's Rocky Mountain sedge)	1	0-1	5
Carex simulata (short-beaked sedge)	5	0-10	14
Carex vesicaria (inflated sedge)	20	0-20	5
Deschampsia cespitosa (tufted hairgrass)	15	0-60	59
Eleocharis palustris (common spikesedge)	80	0-80	5
Eleocharis pauciflora (few-flowered spike-rush)	80	0-80	5
Elymus glaucus (blue wildrye)	20	0-20	5
Hordeum brachyantherum (meadow barley)	7	0-10	9
Hordeum jubatum (foxtail barley)	2	0-3	9
Juncus balticus (Baltic rush)	15	0-40	36
Muhlenbergia filiformis (slender muhly)	6	0-10	9
Phleum alpinum (alpine timothy)	1	0-1	14
Phleum pratense (common timothy)	1	0-1	5
Poa palustris (fowl bluegrass)	18	0-80	23
Poa pratensis (Kentucky bluegrass)	5	0-20	55
Polypogon monspeliensis (rabbitfoot polypogon)	1	0-1	5
Stipa occidentalis (western needlegrass)	1	0-1	5
Trisetum wolfii (Wolf's trisetum)	5	0-20	23

Table 66 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Forbs			
Achillea millefolium (common yarrow)	6	0-20	18
Agoseris glauca (pale agoseris)	1	0-1	5
Angelica arguta (sharptooth angelica)	1	0-1	9
Antennaria corymbosa (meadow pussy-toes)	1	0-1	5
Antennaria microphylla (rosy pussy-toes)	3	0-3	5
Antennaria umbrinella (umber pussy-toes)	3	0-3	5
Arenaria macrophylla (bigleaf sandwort)	1	0-1	5
Arnica chamissonis (meadow arnica)	5	0-20	23
Aster chilensis (long-leaved aster)	12	0-20	18
Aster species (aster)	12	0-20	9
Aster foliaceus (leafy aster)	8	0-20	14
Aster occidentalis (western aster)	6	0-10	27
Cicuta maculata (spotted water-hemlock)	1	0-1	5
Cirsium arvense (Canada thistle)	60	0-60	5
Cirsium scariosum (elk thistle)	1	0-1	5
Epilobium ciliatum (common willow-herb)	1	0-1	23
Epilobium species (willow-herb)	3	0-3	5
Erigeron glabellus (smooth daisy)	1	0-1	5
Erysimum cheiranthoides (wormseed wallflower)	1	0-1	9
Galium trifidum (small bedstraw)	1	0-1	14
Galium triflorum (sweetscented bedstraw)	1	0-1	9
Gentiana affinis (pleated gentian)	1	0-1	5
Geum macrophyllum (larged-leaved avens)	2	0-3	55
Heracleum lanatum (cow-parsnip)	3	0-3	5
Ligusticum tenuifolium (slender-leafed licorice-root)	10	0-10	5
Mentha arvensis (field mint)	11	0-20	18
Mertensia ciliata (mountain bluebell)	1	0-1	5
Pedicularis groenlandica (elephant's head)	1	0-1	5
Penstemon rydbergii (Rydberg's penstemon)	1	0-1	14
Polygonum amphibium (water smartweed)	1	0-1	5
Polygonum bistortoides (American bistort)	1	0-1	5
Polemonium occidentale (western polemonium)	1	0-1	5
Potentilla diversifolia (diverse-leaved cinquefoil)	1	0-1	5
Potentilla gracilis (slender cinquefoil)	2	0-3	27

Table 66 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Potentilla palustris (purple cinquefoil)	3	0-3	5
Rorippa palustris (marsh yellowcress)	1	0-1	5
Rumex crispus (curly dock)	11	0-20	9
Rumex occidentalis (western dock)	1	0-1	5
Rumex salicifolius (willow dock)	1	0-1	9
Senecio cymbalarioides (few-leaved groundsel)	1	0-1	5
Senecio hydrophilus (alkali-marsh butterweed)	15	0-40	14
Senecio integerrimus (western groundsel)	9	0-20	18
Senecio pseudaureus (streambank groundsel)	3	0-3	9
Smilacina stellata (starry Solomon-plume)	1	0-1	5
Solidago canadensis (Canada goldenrod)	2	0-3	9
Spiranthes romanzoffiana (hooded ladies-tresses)	1	0-1	5
Stellaria longipes (longstalk starwort)	1	0-1	9
Stellaria umbellata (umbellate starwort)	3	0-3	5
Taraxacum officinale (common dandelion)	2	0-3	41
Thalictrum fendleri (Fendler's meadowrue)	1	0-1	14
Triglochin palustre (marsh arrow-grass)	1	0-1	5
Valeriana edulis (edible valerian)	1	0-1	9
Viola species (violet)	1	0-1	9
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	1	0-1	5

SOILS

Soils of the *Carex aquatilis* (water sedge) habitat type are typically Histosols (Borofibrists, Borohemists, and Borosaprists) and to a lesser degree, Mollisols (Hansen and others 1995). Surface soil textures vary from clays to sandy loams. Underlying layers tend to be coarser textured, with irregular, organic matter accumulations interspersed throughout the soil solum. Water tables are typically at or near the soil surface throughout most of the year, but can fall below 1 m (39 in) by mid-summer on some sites. *Carex aquatilis* (water sedge) appears slightly less tolerant of anaerobic conditions than *Carex rostrata* (beaked sedge), preferring somewhat drier sites. Soil reaction for this habitat type varies little between slightly acid and neutral (pH 6.0 to 7.0).

ADJACENT COMMUNITIES

Wetter sites support the *Carex rostrata* (beaked sedge) habitat type. Communities on adjacent drier sites are dominated by willows, *Juncus balticus* (Baltic rush), and *Poa pratensis* (Kentucky bluegrass) types. Upland communities support a variety of types including those dominated by conifers, such as *Pseudotsuga menziesii* (Douglas fir) and *Juniperus scopulorum* (Rocky Mountain juniper), or by *Artemisia tridentata* (big sagebrush)/mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

On narrow riparian or wetland sites within extensive rangelands, sedges are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur. Livestock forage value of *Carex aquatilis* (water sedge) is variable, depending upon season, previous grazing use, and the extent of the site. On expansive *Carex aquatilis* (water sedge) sites, livestock can sometimes select more palatable species (Hansen and others 1995).

In general, sedges should respond satisfactorily to the more traditional grazing systems designed for upland species. However, on those sites adjacent to a stream, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife

Elk may graze stands of *Carex aquatilis* (water sedge), but this species is not usually a major food source. Waterfowl consume the seeds produced by associated plants in this type (Hansen and others 1995).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries

This type is often located adjacent to waterways supporting trout fisheries. The rhizomatous growth habit of *Carex aquatilis* (water sedge) forms a dense sod, effectively stabilizing soils and streambanks. Overhanging sod provides valuable cover and shade for fish (Hansen and others 1995).

Fire

The *Carex aquatilis* (water sedge) type is suited to prescribed burning. Nonuse by livestock during the year before burning is essential. Residual cover burns well in spring, before the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition will not drastically change away from dominance by *Carex aquatilis* (water sedge) (DeBenedetti and Parsons 1984).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides.

Soil Management and Rehabilitation Opportunities

Organic soils can be broken and churned by grazing animals when wet. Productivity of sites may be lowered as soils are disturbed and become less favorable to *Carex aquatilis* (water sedge). Rutting can be severe with packstock or hiker use, often resulting in multiple parallel trails. Off road vehicles can cause serious long-term damage. Care should be taken to maintain existing roads to help discourage off road travel. New trails or roads should be located on adjacent uplands (Hansen and others 1995).

Hansen and others (1995) suggest that sedges generally offer better streambank stability than grasses, primarily due to their rhizomatous growth form. *Carex aquatilis* (water sedge) tends to form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur. Nursery grown containerized plants will have the greatest survival rates and growth rates.

The low stream gradient and well-developed floodplain associated with this type results in high rates of recovery through the bank building process. This requires residual spring cover to filter sediments. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Recreational Uses and Considerations

Recreational use is usually confined to the associated fishery. Heavy human use in the spring and summer can result in compacted soils, bank damage, and exposed soils along stream edges. Moderate amounts of late season use have little impact (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

Two additional classification systems that are being used to describe/define riparian and wetland ecosystems are listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Mutz and Queiroz (1983), Mattson (1984), Youngblood and others (1985b), and Chadde and others (1988) described similar *Carex aquatilis* (water sedge) communities in eastern Idaho and western Wyoming. In Utah and southeastern Idaho, Padgett and others (1989) described a similar community. Manning and Padgett (1992) recognize this type in eastern California and Nevada, and Hansen and others (1995) describe two phases of this type for the state of Montana.

Carex lasiocarpa Habitat Type
(Slender Sedge Habitat Type)

CARLAS (CALA16)
Number of Stands Sampled= 20

NOTE: The *Carex lasiocarpa* (slender sedge) habitat type includes all combinations of *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Carex lasiocarpa* (slender sedge) habitat type is an incidental type at mid elevations in valleys of southeastern Idaho, ranging from 1,636 to 1,727 m (5,400 to 5,700 ft). Stands may be found around the periphery of beaver ponds or on broad, level floodplains. In some instances, this type is associated with drier meadows, wet depressions, or margins along lakeshores that are anaerobically favorable to the buildup of deep organic soils.

VEGETATION

Carex lasiocarpa (slender sedge) or *Carex lanuginosa* (woolly sedge) dominate the herbaceous component of this habitat type. In general, both species are not present on site; however, as indicated previously, these sedges occupy similar positions on the landscape with similar environmental conditions and are combined in this habitat type for the purposes of this classification. Overall, *Carex lanuginosa* (woolly sedge) tends to be more prominent in both coverage and constancy for this habitat type. Other associated graminoids and forbs may include *Epilobium ciliatum* (common willow-herb), *Eleocharis palustris* (common spikesedge), *Mentha arvensis* (field mint), and a variety of other sedges (Table 67).

Table 67. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Carex lasiocarpa* (slender sedge) habitat type (number = 7 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Salix candida (hoary willow)	1	0-1	14
Salix planifolia (planeleaf willow)	1	0-1	14
Graminoids			
Agrostis stolonifera (redtop)	1	0-1	14
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	14
Carex atherodes (awned sedge)	6	0-10	29
Carex crawei (Craw's sedge)	1	0-1	14
Carex diandra (lesser-panicled sedge)	1	0-1	14
Carex lanuginosa (woolly sedge)	55	0-98	57
Carex lasiocarpa (slender sedge)	32	0-40	71
Carex nebrascensis (Nebraska sedge)	1	0-1	14
Carex rostrata (beaked sedge)	6	0-10	86
Deschampsia cespitosa (tufted hairgrass)	2	0-3	29
Eleocharis palustris (common spikesedge)	1	0-1	14
Eriophorum polystachion (many-spiked cotton-grass)	10	0-10	14
Glyceria grandis (American mannagrass)	3	0-3	14
Hordeum brachyantherum (meadow barley)	3	0-3	14
Hordeum jubatum (foxtail barley)	1	0-1	14
Forbs			
Cicuta maculata (spotted water-hemlock)	1	0-1	14
Epilobium ciliatum (common willow-herb)	2	0-3	43
Galium trifidum (small bedstraw)	1	0-1	14
Geum aleppicum (yellow avens)	3	0-3	14

Table 67 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Mentha arvensis (field mint)	12	0-20	29
Menyanthes trifoliata (buckbean)	3	0-3	14
Plantago major (common plantain)	3	0-3	14
Polygonum amphibium (water smartweed)	1	0-1	14
Potentilla gracilis (slender cinquefoil)	10	0-10	14
Potamogeton gramineus (grass-leaved pondweed)	1	0-1	14
Ranunculus macounii (Macoun's buttercup)	1	0-1	14
Rumex crispus (curly dock)	3	0-3	14
Scutellaria galericulata (marsh skullcap)	1	0-1	14
Senecio serra (tall butterweed)	3	0-3	14
Ferns and Allies			
Equisetum arvense (field horsetail)	10	0-10	14

SUCCESSIONAL INFORMATION

Grazing pressure by livestock will cause a decrease in *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge), with an increase in weedy or disturbance-induced species such as *Juncus balticus* (Baltic rush) and *Carex nebrascensis* (Nebraska sedge). Severe disturbance may lower water tables and cause a shift toward drier communities dominated by *Poa pratensis* (Kentucky bluegrass), *Phleum pratense* (common timothy), and *Agrostis stolonifera* (redtop) (Table 68). Over time, and with continued disturbance, these sites may shift to upland communities dominated by *Artemisia tridentata* (big sagebrush) shrublands or mixed grasslands.

Table 68. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Carex lasiocarpa* (slender sedge) habitat type (number = 13 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Potentilla fruticosa (shrubby cinquefoil)	3	0-3	8
Salix exigua (sandbar willow)	3	0-3	8
Salix lutea (yellow willow)	3	0-3	8
Graminoids			
Agrostis stolonifera (redtop)	30	0-40	15
Bromus ciliatus (fringed brome)	1	0-1	8
Bromus inermis (smooth brome)	10	0-10	8
Calamagrostis canadensis (bluejoint reedgrass)	1	0-1	8
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-3	38
Carex aquatilis (water sedge)	3	0-3	8
Carex interior (inland sedge)	15	0-20	15
Carex lanuginosa (woolly sedge)	38	0-80	77
Carex lasiocarpa (slender sedge)	10	0-10	23
Carex limosa (mud sedge)	1	0-1	15
Carex livida (pale sedge)	30	0-50	15
Carex nebrascensis (Nebraska sedge)	40	0-60	15
Carex praegracilis (clustered field sedge)	11	0-20	15
Carex rostrata (beaked sedge)	2	0-3	15
Carex scopulorum (Holm's Rocky Mountain sedge)	20	0-20	8
Carex simulata (short-beaked sedge)	1	0-1	8
Carex vesicaria (inflated sedge)	3	0-3	8
Deschampsia cespitosa (tufted hairgrass)	2	0-3	15
Eleocharis palustris (common spikesedge)	40	0-40	8
Festuca idahoensis (Idaho fescue)	1	0-1	8
Hordeum jubatum (foxtail barley)	1	0-1	8
Juncus balticus (Baltic rush)	18	0-40	54
Juncus ensifolius (dagger-leaf rush)	10	0-10	8
Muhlenbergia andina (foxtail muhly)	1	0-1	8
Muhlenbergia filiformis (slender muhly)	2	0-3	15
Phleum pratense (common timothy)	17	0-40	38
Poa palustris (fowl bluegrass)	20	0-20	15
Poa pratensis (Kentucky bluegrass)	13	0-40	38
Scirpus acutus (hardstem bulrush)	11	0-20	15
Stipa occidentalis (western needlegrass)	11	0-20	15
Stipa richardsonii (Richardson's needlegrass)	3	0-3	8
Trisetum wolfii (Wolf's trisetum)	1	0-1	8
Forbs			
Achillea millefolium (common yarrow)	1	0-1	23
Anemone multifida (cliff anemone)	1	0-1	8
Angelica arguta (sharptooth angelica)	1	0-1	8
Antennaria species (everlasting; pussy-toes)	1	0-1	8
Antennaria microphylla (rosy pussy-toes)	1	0-1	8
Astragalus canadensis (Canada milk-vetch)	3	0-3	8
Aster chilensis (long-leaved aster)	3	0-3	8
Aster species (aster)	3	0-3	8
Aster foliaceus (leafy aster)	2	0-3	15
Aster occidentalis (western aster)	3	0-3	8
Cicuta maculata (spotted water-hemlock)	40	0-40	8
Cirsium arvense (Canada thistle)	3	0-3	8
Cirsium scariosum (elk thistle)	3	0-3	15

Table 68 (cont.)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Drosera anglica (great sundew)	1	0-1	8
Drosera linearis (linear-leaved sundew)	1	0-1	15
Epilobium ciliatum (common willow-herb)	1	0-1	23
Fragaria virginiana (Virginia strawberry)	1	0-1	8
Galium boreale (northern bedstraw)	1	0-1	8
Galium species (bedstraw)	1	0-1	8
Gentianella detonsa (smaller fringed gentian)	1	0-1	15
Geranium species (geranium; crane's-bill)	1	0-1	8
Geum macrophyllum (larged-leaved avens)	1	0-1	8
Habenaria species (bog-orchid; Rein-orchid)	1	0-1	8
Helianthus nuttallii (Nuttall's sunflower)	11	0-20	15
Linum perenne (blue flax)	2	0-3	15
Melilotus officinalis (yellow sweet-clover)	1	0-1	8
Mentha arvensis (field mint)	3	0-3	8
Menyanthes trifoliata (buckbean)	10	0-10	15
Parnassia palustris (northern grass-of-parnassus)	1	0-1	8
Perideridia gairdneri (Gairdner's yampah)	1	0-1	8
Polygonum hydropiper (marshpepper smartweed)	3	0-3	8
Potentilla anserina (common silverweed)	11	0-20	31
Potentilla gracilis (slender cinquefoil)	1	0-1	8
Ranunculus cymbalaria (shore buttercup)	20	0-20	8
Senecio hydrophilus (alkali-marsh butterweed)	3	0-3	8
Smilacina stellata (starry Solomon-plume)	1	0-1	23
Solidago canadensis (Canada goldenrod)	6	0-10	15
Taraxacum officinale (common dandelion)	2	0-3	15
Triglochin maritimum (seaside arrow-grass)	1	0-1	8
Typha latifolia (common cattail)	1	0-1	8
Ferns and Allies			
Equisetum fluviatile (water horsetail)	10	0-10	8
Equisetum laevigatum (smooth scouring-rush)	2	0-3	31

SOILS

Hansen and others (1995) indicate that soils are usually classified as Histosols (Borofibrists, Borohemists, and Borosaprists), although Entisols and Mollisols may be present on floodplains that are more active. Leaf litter from previous years usually accumulates on the soil surface, occasionally up to depths of 5 cm (2 in). Surface textures are predominantly sandy loams or loams. These upper horizons, reaching depths over 60 cm (24 in) on some sites, are typically underlain by sand, gravel and/or cobble deposits, consistent with compositions of nearby channel bottoms. Soils are poorly to very poorly drained. Sites are often flooded into July and August with water tables remaining within the root zone throughout the growing season.

ADJACENT COMMUNITIES

Due to differences in moisture, substrate composition, flooding frequency, and a variety of other physical site factors, riparian corridors are often characterized by a diversity of species forming a mosaic of distinct, localized communities. Adjacent wetter communities may be dominated by either the *Carex rostrata* (beaked sedge) or the *Eleocharis palustris* (common spikesedge) habitat types, or the *Carex nebrascensis* (Nebraska sedge) community type. Neighboring riparian shrub communities associated with the *Carex lasiocarpa* (slender sedge) habitat type include: *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix exigua* (sandbar willow) types. Drier riparian communities are occupied by *Juncus balticus* (Baltic rush) and *Agrostis stolonifera* (redtop). Adjacent uplands are typically vegetated with *Artemisia tridentata* (big sagebrush)/mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Estimated herbage production is moderate to high ranging from 1,000 to 3,000 lbs/acre dry weight (Kovalchik 1987). *Carex lasiocarpa* (slender sedge) receives limited use by livestock due to its low palatability, although *Carex lanuginosa* (woolly sedge) is highly palatable and may attract earlier use than desired. Livestock tend to avoid the wet meadows or basins until they are dry at the surface, usually in late July or early August. *Carex lasiocarpa* (slender sedge) and *Carex lanuginosa* (woolly sedge) will rapidly reoccupy moderately disturbed sites with rest and late season grazing. Livestock should be removed before 40 percent of the summer/fall forage has been utilized to insure an upward trend in ecological status (Kovalchik 1987).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife
The *Carex lasiocarpa* (slender sedge) habitat type is generally flooded long enough to provide nesting habitat for waterfowl. However, is has limited use by songbirds and small mammals because of the lack of diversity and flooded soils. It is an important habitat for raptors, deer, and elk. Deer use the type for fawning.

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated.

Fire
High water tables make burning difficult. However, meadows and basins can be burned in the late summer. Fire can be used in late spring or early summer on sites adjacent to floodplains. Fire will help reduce litter accumulations and competitors. Dominant sedges of this habitat type are resistant to damage by fire except where hot fires penetrate the peat soil.

Soil Management and Rehabilitation Opportunities
Mechanical use should be avoided because of the fragile nature of wet, organic soils. Livestock should be kept off these sites until the surface soils are dry. Trails and roads should be located on the adjacent uplands.

Carex lasiocarpa (slender sedge) and *Carex lanuginosa* (woolly sedge) are useful for improving degraded sites. Their long, creeping rhizomes form a dense mat, effectively stabilizing streambank soils. Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
The sites provide good opportunities for viewing deer, elk, and waterfowl. Floodplain sites adjacent to streams are often used as fishing access points.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

OTHER STUDIES

The *Carex lasiocarpa* (slender sedge) habitat type is similar to the *Carex lanuginosa* (woolly sedge) and the *Carex lasiocarpa* (slender sedge) associations described by Kovalchik (1987) for central Oregon, and Manning and Padgett (1992) for Nevada and eastern California. Padgett and others (1989) describe a similar community for Utah and southeastern Idaho, as does Hansen and others (1995) for the state of Montana.

Carex nebrascensis Community Type
(Nebraska Sedge Community Type)

CARNEB (CANE2)
Number of Stands Sampled = 17

LOCATION AND ASSOCIATED LANDFORMS

The *Carex nebrascensis* (Nebraska sedge) community type occurs across southcentral and eastern Idaho, ranging in elevations from 1,484 to 1,878 m (4,900 to 6,200 ft). This minor type often colonizes level, gently sloping benches with high water tables associated with seeps/springs, establishing broad meadows or narrow belts. It also borders streams and rivers on floodplains in U-shaped canyons and on broader, more gradual drainages. If sufficient moisture is present, *Carex nebrascensis* (Nebraska sedge) appears along the fringe of active or abandoned beaver complexes and at the edges of oxbows and other backwater areas.

VEGETATION

Carex nebrascensis (Nebraska sedge) forms essentially a monoculture at some locations, but may contain *Juncus balticus* (Baltic rush) or a variety of sedges as lesser components on other sites. Depending on the level of disturbance, an assortment of graminoids and forbs, including *Agrostis stolonifera* (redtop), *Epilobium ciliatum* (common willow-herb) and *Poa pratensis*

(Kentucky bluegrass), may be present (Table 69). The *Carex nebrascensis* (Nebraska sedge) community type represents a grazing disclimax in Idaho and is generally found on heavily disturbed sites.

Table 69. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Carex nebrascensis* (Nebraska sedge) habitat type (number = 17 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Graminoids			
Carex nebrascensis (Nebraska sedge)	81	20-98	100
Juncus balticus (Baltic rush)	7	0-20	41
Forbs			
Epilobium ciliatum (common willow-herb)	2	0-3	35

SUCCESSIONAL INFORMATION

Hansen and others (1995) indicate that the *Carex nebrascensis* (Nebraska sedge) community type is a grazing disclimax typically representing an early/mid-seral secondary successional type. Numerous fence line contrasts illustrate that *Carex nebrascensis* (Nebraska sedge) acts as an increaser and/or invader. It is strongly rhizomatous with high underground biomass that, while being highly palatable to livestock, appears to withstand moderate to heavy grazing pressures. Under continued season long grazing, *Carex nebrascensis* (Nebraska sedge) acts as an increaser, replacing former climax dominants (Youngblood and others 1985b, Kovalchik 1986, Kovalchik 1987). However, due to its tolerance to grazing and ability to form dense, rhizomatous root mats, once established, *Carex nebrascensis* (Nebraska sedge) may be difficult to displace, even by *Carex rostrata* (beaked sedge).

SOILS

Mollisols seem to be the most common soil order occupied by this type, although Inceptisols and Histosols are occasionally present (Youngblood and others 1985a, Padgett and others 1989). Surface soil textures typically range from silty clay loams to silt clays, although sandy loams have been observed on some sites. Padgett and others (1989) indicate that this type seldom occurs on organic soils in Utah; nevertheless, in the study area *Carex nebrascensis* (Nebraska sedge) often prospers on nutrient rich, organic soils 45 cm (18 in) or more in depth. This observation is consistent with the findings of Youngblood and others (1985a) for Wyoming and eastern Idaho. Soils often remain saturated throughout summer months, but water tables occasionally drop below 1 m (39 in) of the soil surface towards the end of the growing season. Available water holding capacities are estimated to be moderate to high (Padgett and others 1989). Shallow water tables provide optimal conditions for oxidation and reduction reactions.

ADJACENT COMMUNITIES

Adjacent wetter sites may be inhabited by the *Scirpus acutus* (hardstem bulrush), *Typha latifolia* (common cattail), *Eleocharis palustris* (common spikesedge), and *Carex rostrata* (beaked sedge) habitat types. A variety of willow communities usually associated with the *Carex nebrascensis* (Nebraska sedge) community type are dominated by: *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix exigua* (sandbar willow) types. Drier riparian communities include the *Rhus aromatica* (fragrant sumac), *Juniperus scopulorum* (Rocky Mountain juniper), *Agrostis stolonifera* (redtop), *Juncus balticus* (Baltic rush), and *Poa pratensis* (Kentucky bluegrass) types. *Artemisia* species (sagebrush) steppe or mixed grasslands are common on neighboring uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Because forage production is high for this community type, livestock utilization may be intense. *Carex nebrascensis* (Nebraska sedge) is palatable to both cattle and horses, especially in the spring and early summer when stems and leaves are tender (Lewis 1958, Hermann 1970). *Carex nebrascensis* (Nebraska sedge) withstands heavy utilization without apparent damage, primarily due to its rhizomatous habit and favorable moisture conditions on site (USDA Forest Service 1937). However, repeated defoliation during the period of early shoot growth depletes root carbohydrate reserves and lessens plant vigor (Steele and others 1984).

Late season grazing of this type after surface soils have begun to dry will lessen trampling damage to plant rhizomes and will allow degraded streambanks to stabilize. However, on those stands adjacent to streams, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for the sedge regrowth should provide sufficient residual cover (Myers 1989).

Wildlife

Forage value of *Carex nebrascensis* (Nebraska sedge) rates high to moderate for elk and medium for mule deer (Manning and Padgett 1992). It may also provide food and cover for waterfowl and small game (Youngblood and others 1985a).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fire
Hansen and others (1995) indicate that preliminary information suggests that the *Carex nebrascensis* (Nebraska sedge) community type is suited to prescribed burning. Nonuse by livestock during the year before burning is essential. Residual cover burns well in spring, before the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition probably will not drastically change away from dominance by *Carex nebrascensis* (Nebraska sedge).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides. Removal of *Carex nebrascensis* (Nebraska sedge) may increase the susceptibility of soil erosion from overland flows during fall rains or spring runoff (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
The strongly rhizomatous nature of this type makes it valuable for streambank stabilization and provides protective overhanging sod on undercut banks. These fine textured soils are typically saturated to the surface in spring and early summer, making them highly susceptible to compaction by livestock and mechanical damage. Human trampling damage also occurs around popular fishing areas. Heavy machinery use should be avoided (Hansen and others 1995). Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar *Carex nebrascensis* (Nebraska sedge) communities have been identified by Norton and others (1981), Ratliff (1982), Mutz and Queiroz (1983), Youngblood and others (1985b), Kovalchik (1987), Padgett and others (1989), Manning and Padgett (1992), and by Hansen and others (1995).

Carex rostrata Habitat Type
(Beaked Sedge Habitat Type)

CARROS (CARO6)
Number of Stands Sampled = 12

Note: The *Carex rostrata* (beaked sedge) habitat type includes all combinations of *Carex rostrata* (beaked sedge), *Carex vesicaria* (inflated sedge), and *Carex atherodes* (awned sedge) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Carex rostrata* (beaked sedge) habitat type, a major type throughout eastern and southcentral Idaho, ranges in elevation from 1,061 to 2,000 m (3,500 to 6,600 ft). This habitat type, representing potentially one of the wettest riparian and wetland communities, may occupy sites inundated with a few inches of standing/slow-flowing water or may establish on somewhat drier, saturated sites lacking surface water for part of the year. *Carex rostrata* (beaked sedge) typically colonizes wet meadow/seeps with subsurface flow and is often associated with active or abandoned beaver complexes. It may also colonize banks adjacent to active channels, appearing in U-and V-shaped canyon drainages, or on islands, oxbows, bars, and floodplains of major riverine systems. Where overland flow is present, *Carex rostrata* (beaked sedge) may form hummocks or tussocks, which develop over time as individual sod clusters that resist the gradual erosion and downcutting of associated, numerous micro-channels.

VEGETATION

The diagnostic species, *Carex rostrata* (beaked sedge), dominates this habitat type, essentially forming a monoculture on most sites. The rhizomatous root network forms a dense mat, often precluding the establishment of competing graminoids and forbs. Other herbaceous species that may be present, generally characterized by low coverages and constancies, may include *Agrostis stolonifera* (redtop), *Epilobium ciliatum* (common willow-herb), or assorted sedges (Table 70).

Table 70. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Carex rostrata* (beaked sedge) habitat type (number = 12 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Graminoids			
Agrostis stolonifera (redtop)	7	0-20	25
Carex nebrascensis (Nebraska sedge)	1	0-1	25
Carex rostrata (beaked sedge)	89	70-98	100
Eleocharis palustris (common spikesedge)	4	0-10	25
Phalaris arundinacea (reed canarygrass)	2	0-3	25
Forbs			
Epilobium ciliatum (common willow-herb)	1	0-1	33
Typha latifolia (common cattail)	2	0-3	25

SUCCESSIONAL INFORMATION

Carex rostrata (beaked sedge) may colonize newly deposited mineral soils on saturated sites associated with beaver ponds (Padgett and others 1989), functioning as a pioneer species, yet remain as the climax vegetation with the development of a thick, rhizomatous mat that, in combination with high water tables, prevents the invasion and establishment of other species. Shoot density was observed to be higher on seasonally flooded sites than on sites characterized by year round surface water (Sjoberb and Danell 1983), indicating that stands may recede over time with prolonged inundation. Hansen and others (1995) note that high water tables throughout the growing season tend to limit access by livestock and thereby reduce impacts from various forms of disturbance. Nevertheless, severe grazing pressures can greatly reduce the cover of *Carex rostrata* (beaked sedge) while increasing the cover of disturbance-caused herbaceous species such as *Carex nebrascensis* (Nebraska sedge), *Juncus nodosus* (tuberous rush), and *Equisetum arvense* (field horsetail). Where physical site alterations, such as the deterioration of beaver dams, cause drying trends, certain species, especially willows or other sedges, may dominate sites.

SOILS

The *Carex rostrata* (beaked sedge) habitat type occupies a wide range of soil types, with surface textures ranging from silt loams and silty clays to loamy sands. On long-lived stands where surface water is present, rich, black organic soils may form a fine muck, potentially to depths of 1 m (39 in) or more. Litter/duff layers, from previous years leaves, may be 12 cm (5 in) deep in extreme cases. Subsurface horizons are usually composed of sands, gravels, and cobbles, consistent with channel bottom substrates. Mollisols and Histosols are the most common soil orders present on older sites often associated with beaver ponds and meadow seeps (Padgett and others 1989), while more recently occupied sites with less developed soils are typically classified as Entisols (Youngblood and others 1985a). High water tables facilitate oxidation/reduction reactions, which produce mottled, or gleyed soil characteristics according to the dominant water regimes. Water tables are generally at or near the surface, but may be as deep as 1 m (39 in) or as high as a few inches above the ground level (Youngblood and others 1985a). Padgett and others (1989) speculate that soils of this type tend to be more anaerobic than those of the *Carex aquatilis* (water sedge) habitat type.

ADJACENT COMMUNITIES

Scirpus acutus (hardstem bulrush) and *Typha latifolia* (common cattail) may occupy adjacent streamside zones, typically colonizing deeper waters where more anaerobic conditions preclude *Carex rostrata* (beaked sedge). Equally saturated or slightly drier zones support a variety of types, dominated by *Juncus balticus* (Baltic rush), *Eleocharis palustris* (common spikesedge), and other sedges. Associated shrub communities are represented by various willows, such as *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), and *Salix exigua* (sandbar willow), or *Betula occidentalis* (water birch). *Picea* species (spruce) and *Populus tremuloides* (quaking aspen) may establish narrow corridors within riparian zones adjacent to *Carex rostrata* (beaked sedge) on cool, moist, narrow drainages. Uplands are dominated by *Artemisia tridentata* (big sagebrush)/ mixed grass shrublands, or by *Juniperus scopulorum* (Rocky Mountain juniper) or *Pseudotsuga menziesii* (Douglas fir) forests.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Livestock forage value of *Carex rostrata* (beaked sedge) varies, depending upon season, previous grazing use, and the extent of the site. On narrow riparian or wetland sites within extensive rangelands, sedge species are heavily utilized, particularly when upland plants are cured, or where livestock distribution and stocking rate problems occur. On expansive *Carex rostrata* (beaked sedge) sites, livestock can sometimes select more palatable species (Hansen and others 1995).

In general, sedges should respond satisfactorily to the more traditional grazing systems designed for upland species. However, on those sites adjacent to a stream, residual cover should be left to filter out sediments during the fall rains or spring runoff. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

Frisina (1991) states that for a grazing program to be successful, it must meet the basic biological requirements of the plants such as photosynthesis, food storage, reproduction, and seedling establishment. In order to meet these requirements, long periods of rest are needed. It is during long growing season rest periods that the essential biological processes of food production and storage, reproduction, and seedling establishment take place. In some instances, additional periods of rest may be required to either improve or maintain a plant community.

Wildlife
Elk and moose may graze stands of this type although palatability may be poor due to the coarse, tough herbage of *Carex rostrata* (beaked sedge) (Youngblood and others 1985b).

Beaver perform a vital role in the health and maintenance of riparian ecosystems. Beaver dams assist in controlling the downcutting of channels, bank erosion, and the movement of sediment downstream (Gordon and others 1992). When beaver construct a dam, they raise the water table in the area, which provides water for hydrophytic plants such as willows and sedges. The beaver dam also slows down the water in the channel, which allows suspended sediment to be deposited behind the dam. The combination of sediment deposition and plant reproduction raises the channel bed, creating a wetland environment, which is excellent waterfowl and fish habitat. It has often been the policy of land managers to trap and kill beaver because they can be a nuisance. However, because beaver produce such desirable habitat and provide many beneficial stream functions, their removal from a riparian system needs to be closely evaluated (Hansen and others 1995).

Fisheries
The rhizomatous, sod forming root growth of *Carex rostrata* (beaked sedge) makes it an exceptional choice for streambank stabilization. Moreover, the dense shoot growth may act to slow flows and filter sediments where stands occur immediately adjacent to streambanks, and undercut sod mats that overhang channels may provide excellent cover for various fish species (Hansen and others 1995).

Fire
The *Carex rostrata* (beaked sedge) type is suited to prescribed burning. Nonuse by livestock during the year before burning is essential. Residual cover burns well in the spring, before the growing season. Fire will reduce litter accumulations and temporarily increase productivity. However, species composition will not drastically shift from dominance by *Carex rostrata* (beaked sedge) (DeBenedetti and Parsons 1984).

Care should be taken when burning stands along streambanks because of the excellent erosion protection this type provides.

Soil Management and Rehabilitation Opportunities
Organic soils are easily trampled and compacted by grazing animals. Mineral soils are also easily damaged if use occurs when soils are moist. Rutting can be severe with packstock or hiker use, often resulting in multiple parallel trails. Off road vehicles can cause serious long-term damage. Care should be taken to maintain existing roads to help discourage off road travel. New trails or roads should be located on adjacent uplands (Hansen and others 1995).

In general, sedges offer better streambank stability than grasses, primarily due to their rhizomatous growth form. *Carex rostrata* (beaked sedge) and *Carex aquatilis* (water sedge) tend to form a dense, thick sod that is highly resistant to erosion. Along the stream, the sod may be undercut and sag into the water, providing additional protection to streambanks. However, if grazing or trailing impacts are severe, the heavy weight of the sod makes it susceptible to damage, and streambank sloughing can occur (Hansen and others 1995). Nursery grown containerized plants will have the greatest survival rates and growth rates.

The low stream gradient and well-developed floodplain associated with this type results in high rates of recovery through the bank building process. This requires residual spring cover to filter sediments. Removing cattle to allow at least 30 days for sedge regrowth should provide sufficient residual cover (Myers 1989).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded to saturated.

OTHER STUDIES

Numerous other studies have identified similar communities, reflective of the widespread distribution of this type: Hansen and others (1995), Norton and others (1981), Ratliff (1982), Tuhy and Jensen (1982), Mutz and Queiroz (1983), Mattson (1984), Youngblood and others (1985b), Kovalchik (1987), Chadde and others (1988), Padgett and others (1989), Manning and Padgett (1992).

Agrostis stolonifera Community Type
(Redtop Community Type)

AGRSTO (AGST)
Number of Stands Sampled = 9

NOTE: The *Agrostis stolonifera* (redtop) community type includes all combinations of *Agrostis stolonifera* (redtop) and *Agrostis exarata* (spike bentgrass) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Agrostis stolonifera* (redtop) community type is an incidental type at mid elevations, ranging from 1,650 to 1,727 m (5,445 to 5,700 ft). Stands may colonize recently deposited alluvial bars and wet meadows associated with level floodplains of minor stream systems.

VEGETATION

This community type may develop as essentially homogeneous stands of *Agrostis stolonifera* (redtop) or *Agrostis exarata* (spike bentgrass), but more often appears as mixed stands of graminoids and forbs dominated by either of the diagnostic species. Associated species may include sedges, *Juncus* species (rush), *Achillea millefolium* (common yarrow), and *Poa pratensis* (Kentucky bluegrass) (Table 72). Where sites occur on recently deposited alluvial bars, the combined canopy cover of all species may be relatively low.

Table 72. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the *Agrostis stolonifera* (redtop) community type (number = 9 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Agrostis exarata (spike bentgrass)	85	0-90	22
Agrostis stolonifera (redtop)	78	0-98	89
Juncus balticus (Baltic rush)	4	0-10	78
Poa pratensis (Kentucky bluegrass)	8	0-20	89
Forbs			
Achillea millefolium (common yarrow)	1	0-3	56
Cirsium arvense (Canada thistle)	3	0-10	44
Mentha arvensis (field mint)	2	0-3	33
Rumex crispus (curly dock)	2	0-3	33

SUCCESSIONAL INFORMATION

Agrostis stolonifera (redtop) is an early seral (pioneer) species, often colonizing recently exposed sediment deposits. This species may be considered an increaser and is indicative of past or present disturbance on locations where it is found. Overgrazing by herbivores can produce significant changes on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizome system of *Agrostis stolonifera* (redtop) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants questionable. Close observation of associated species on similar locations may provide insight to the potential climax communities, such as various willows, *Scirpus acutus* (hardstem bulrush), *Typha latifolia* (common cattail), *Eleocharis palustris* (common spikesedge), and assorted sedges.

SOILS

Soils occupied by this type are typically Entisols (Fluvents) or Mollisols (Borolls) (Hansen and others 1995). The *Agrostis stolonifera* (redtop) community type thrives best on moist to semi-wet soils. It is tolerant of poorly drained wetlands and subirrigated sites, submergence, and frequent flooding. It occurs across a broad range of soil textures from clays to sandy loams; however, where moisture is limiting, *Agrostis stolonifera* (redtop) may be restricted to clay loam and loam soils. It is tolerant of medium acid (pH 5.5) and nutritionally poor soils low in calcium, phosphorus, and potassium (Wasser 1982). This type is also fairly tolerant of saline soils and is moderately tolerant of drought. Shallow water tables promote oxidation and reduction reactions, resulting in gleyed and mottled soil features.

ADJACENT COMMUNITIES

Sedges, bulrushes, *Typha latifolia* (common cattail), and occasionally rushes generally dominate zones along streambanks and channels. Adjacent drier riparian sites support a diversity of communities including those within the cottonwoods, willows, and juniper types. Uplands may be dominated by *Juniperus scopulorum* (Rocky Mountain juniper), *Artemisia tridentata* (big sagebrush), and mixed grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Agrostis stolonifera* (redtop) community type is moderately productive, and provides a significant amount of forage. Although *Agrostis stolonifera* (redtop) is not as palatable as other species, the community type provides forage throughout the summer due to high water tables. It is rated as having good palatability in the spring and early summer, with fair palatability after heads seed out. Palatability is rated as poor in the winter. *Agrostis* *stolonifera* (redtop) is rated as fairly good to good forage for livestock (USDA Forest Service 1937).

In pastures, close grazing, followed by rest in a rotation system, is recommended to keep plants producing palatable growth throughout the growing season (Vallentine 1967). *Agrostis stolonifera* (redtop) is tolerant of close use due to its somewhat prostrate growth form, rhizomatous growth habitat, and lower palatability than associated species. Plants should be cut during the early flowering stage to obtain highest quality hay (Hansen and others 1995).

Wildlife
Elk and deer make use of the grasses and forbs of this type. Waterfowl utilize *Agrostis stolonifera* (redtop) for food and cover (Hansen and others 1995).

Fisheries
The *Agrostis stolonifera* (redtop) community type is moderately effective in stabilizing streambanks due to its typically dense network of intertwining root and rhizomes. However, bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing (Hansen and others 1995). Mixed stands with higher densities of non-rhizomatous species offer poor bank stabilization.

Fire
Agrostis stolonifera (redtop) is rated as only having a fair tolerance to fire (Wasser 1982).

Soil Management and Rehabilitation Opportunities
Potential for soil compaction is greatest in spring when soils are moist. The associated graminoids of this type provide limited streambank protection, making the potential for erosional problems quite high. Managers need to pay close attention to streambanks associated with the *Agrostis stolonifera* (redtop) community type in order to detect early signs of streambank collapse. If there is no change in management, once the stream bank starts to degrade, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

A similar community type has been defined for the Upper Salmon/Middle Fork Salmon River drainages, Idaho, by Tuhy and Jensen (1982), for meadows of the Sierra Nevada, California, by Ratliff (1982), and by Hansen and others (1995) for Montana.

Bromus inermis Community Type
(Smooth Brome Community Type)

BROINE (BRIN)
Number of Stands Sampled = 5

LOCATION AND ASSOCIATED LANDFORMS

The *Bromus inermis* (smooth brome) community type occurs at low to mid elevations. Sites range from 1,272 to 1,636 m (4,200 to 5,400 ft). Stands of this incidental type often dominate mesic, alluvial terraces of stream and river systems that were previously cultivated hay meadows or subjected to high grazing pressures.

VEGETATION

Bromus inermis (smooth brome), a European native that is now naturalized in North America, acts as a disturbance-induced species. Livestock and agricultural practices are the primary reason for its introduction into the West. Stands of this type may be homogeneous, appearing as a monoculture dominated by *Bromus inermis* (smooth brome), or contain a mixture of herbaceous "weedy" species such as *Poa pratensis* (Kentucky bluegrass) and *Agrostis stolonifera* (redtop) (Table 73). This type represents one of the drier herbaceous riparian or wetland community types.

Table 73. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Bromus inermis* (smooth brome) community type (number = 5 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Agropyron caninum (bearded wheatgrass)	3	0-3	40
Agrostis stolonifera (redtop)	2	0-3	60
Bromus inermis (smooth brome)	72	40-98	100
Poa pratensis (Kentucky bluegrass)	4	0-10	60
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	7	0-10	40

SUCCESSIONAL INFORMATION

The *Bromus inermis* (smooth brome) community type represents an early/mid-seral grazing disclimax in some locations. Once a suitable site is disturbed, the extensive rhizome system of *Bromus inermis* (smooth brome) allows it to spread rapidly and establish on these areas. It also withstands high levels of utilization, making replacement by native species difficult. Close observation of similar sites may give insight to the climax community for a particular area. However, severe disturbance may cause desiccation in some locations and alter the potential of the sites.

SOILS

Soils are typically Mollisols (Borolls) or Entisols (Fluvents) (Hansen and others 1995). *Bromus inermis* (smooth brome) thrives on moist, well-drained, soils ranging from silty clay loams to sandy loams. It does poorly on sandy or dense clay soils. Leaf and stem litter layers may be extensive on some sites, reaching depths of 7.5 cm (3 in). Upper surface horizons are generally nutrient rich because of annual inputs to the litter layer from *Bromus inermis* (smooth brome), which dies back each year. Sands, gravels, and cobbles usually constitute the main body of deeper subsurface materials. *Bromus inermis* (smooth brome) is generally intolerant of prolonged flooding, seasonally high water tables, or poor drainage. It is tolerant of weakly acidic to slightly alkaline soils.

ADJACENT COMMUNITIES

Wetter sites support a wide range of communities including those within the cottonwoods, willows, *Carex rostrata* (beaked sedge), and *Juncus balticus* (Baltic rush) types. *Artemisia* species (sagebrush) steppe or mixed grasslands are common on neighboring uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

The *Bromus inermis* (smooth brome) community type has a high forage value. *Bromus inermis* (smooth brome) is highly palatable to livestock when green, but low during the winter (USDA Forest Service 1973). Growth begins in early spring and continues into June (or later at higher elevations). During the summer, *Bromus inermis* (smooth brome) becomes semi-dormant until the onset of cooler, rainy fall weather. Fall regrowth is often abundant.

A moderate grazing intensity of the *Bromus inermis* (smooth brome) community type in the spring and fall can complement native ranges grazed during the summer. A rotation grazing system encourages more uniform grazing use. Periodic rest when *Bromus inermis* (smooth brome) is actively growing helps maintain vigorous stands (Wasser 1982).

Bromus inermis (smooth brome) is a highly competitive, sod-forming grass. It has a dense system of shallow, fibrous roots and rhizomes and an extensive network of deeper roots in well-drained sites. However, high water tables that create saturated conditions within the rooting zone of *Bromus inermis* (smooth brome) causes a decrease in the number of roots leading to a reduction in the overall vigor of the plant. Dense monocultures typically become sod-bound 3-5 years after establishment (Wasser 1982).

Grazing practices influence the type of growth form present. A high density of weak, low vigor tillers results under season long grazing. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater. Streambanks associated with *Bromus inermis* (smooth brome) stands are susceptible to sloughing.

Wildlife

Elk and deer make use of the grasses and forbs of this type, especially in early spring when other forages have not yet greened (Gaffney 1941, Singer 1975). Waterfowl utilize *Bromus inermis* (smooth brome) for food and cover. Canada geese often graze young plants (Martin and others 1951). Upland game birds, small mammals, and small nongame birds also use this type for cover, but species diversity is typically low (Dittberner and Olson 1983).

Fisheries

The *Bromus inermis* (smooth brome) community type is not very effective in stabilizing streambanks. Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

Fire

Bromus inermis (smooth brome) is well adapted to fire, and is able to quickly resprout following burning because of its extensive network of rhizomes. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Fire is an effective tool to remove excessive litter accumulations common on rested or lightly grazed stands. Cool burns will have little effect on *Bromus inermis* (smooth brome) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

The potential for soil compaction is greatest in the spring when soils are moist. *Bromus inermis* (smooth brome) has an extensive rhizome system, but its shallow rooting characteristics in all but well-drained sites make it only marginally effective in stabilizing streambanks. The potential for erosional problems associated with this community type can be quite high. Managers need to pay close attention to streambanks associated with *Bromus inermis* (smooth brome) community type in order to detect early signs of streambank collapse. Once the streambank starts to degrade, with no change in management, little can be done to save it short of expensive riprap.

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

Two additional classification systems that are being used to describe/define riparian and wetland ecosystems are listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

The *Bromus inermis* (smooth brome) community type has been described by Hansen and others (1995) for the state of Montana.

Eleocharis palustris Habitat Type (Common Spikesedge Habitat Type)

ELEPAL (ELPA3)
Number of Stands Sampled = 29

NOTE: The *Eleocharis palustris* (common spikesedge) habitat type includes all combinations of *Eleocharis palustris* (common spikesedge) and *Eleocharis acicularis* (needle spike-rush) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Eleocharis palustris* (common spikesedge) habitat type is a minor type throughout southeastern and central Idaho, ranging in elevation from 1,424 to 2,000 m (4,700 to 6,600 ft). This habitat type typically occurs on sites prone to yearly flooding or persistent surface water. It appears in and adjacent to low gradient stream and river corridors in open valleys or U-shaped drainages, and along the periphery of beaver impoundments, sloughs, lakes margins, and reservoirs. It appears tolerant of moderately saline or alkali water.

VEGETATION

Eleocharis palustris (common spikesedge) clearly dominates sites occupied by this type, often forming monocultures. On more heterogeneous sites, a diversity of associated graminoids and forbs, generally characterized by low coverage and constancy, include sedges, bulrushes, and *Polygonum amphibium* (water smartweed) (Table 74). Types and levels of disturbances may account for significant discrepancies in species diversity and cover.

Table 74. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Eleocharis palustris* (common spikesedge) habitat type (number = 6 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Carex retrorsa (retrorse sedge)	3	0-3	17
Carex rostrata (beaked sedge)	3	0-3	17
Carex vesicaria (inflated sedge)	1	0-1	17
Eleocharis palustris (common spikesedge)	89	60-98	100
Phalaris arundinacea (reed canarygrass)	1	0-1	17
Scirpus acutus (hardstem bulrush)	2	0-3	33
Forbs			
Hippuris vulgaris (common mare's-tail)	1	0-1	17
Myosotis scorpioides (common forget-me-not)	3	0-3	17
Polygonum amphibium (water smartweed)	1	0-1	33
Rorippa curvipes (blunt-leaved yellowcress)	1	0-1	17
Rumex crispus (curly dock)	1	0-1	17

SUCCESSIONAL INFORMATION

Eleocharis palustris (common spikesedge) may represent an early seral, pioneer species at the margins of ponds and along streambanks where water is at or above the ground surface. It appears intolerant of shade, and will decline if taller, aggressive species such as sedges, bulrushes, and Typha latifolia (common cattail), invade. However, due to the continually saturated site conditions that E*leocharis palustris* (common spikesedge) prefers, and its dense growth form, once established, stands are difficult to displace and may persist as the climax vegetation (Padgett and others 1989). With disturbance, *Eleocharis palustris* (common spikesedge) coverage may decrease as weedy and disturbance-induced species, such as *Hordeum jubatum* (foxtail barley), *Mentha arvensis* (field mint), and dock species, increase (Table 75).

Table 75. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Eleocharis palustris* (common spikesedge) habitat type (number = 23 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Populus trichocarpa (black cottonwood)	1	0-1	4
Shrubs			
Rosa species (rose)	10	0-10	4
Rosa woodsii (woods rose)	1	0-1	4
Symphoricarpos species (snowberry)	3	0-3	4
Graminoids			
Agrostis scabra (tickle-grass)	30	0-30	4
Agrostis stolonifera (redtop)	60	0-60	4
Alopecurus aequalis (short-awn foxtail)	13	0-50	17
Alopecurus geniculatus (water foxtail)	3	0-3	4
Beckmannia syzigachne (American sloughgrass)	16	0-40	17
Carex atherodes (awned sedge)	1	0-1	4
Carex athrostachya (slender-beaked sedge)	60	0-60	4
Carex leptalea (bristle-stalked sedge)	1	0-1	4
Carex nebrascensis (Nebraska sedge)	1	0-1	4
Carex praticola (meadow sedge)	3	0-3	4
Carex rostrata (beaked sedge)	4	0-10	22
Carex unilateralis (one-sided sedge)	33	0-40	13
Carex vesicaria (inflated sedge)	2	0-3	9
Deschampsia cespitosa (tufted hairgrass)	1	0-3	22
Eleocharis acicularis (needle spike-rush)	38	0-70	22
Eleocharis palustris (common spikesedge)	42	0-90	91
Glyceria borealis (northern mannagrass)	10	0-10	4
Glyceria grandis (American mannagrass)	1	0-1	4
Glyceria striata (fowl mannagrass)	40	0-40	4
Hordeum jubatum (foxtail barley)	18	0-80	30
Juncus balticus (Baltic rush)	22	0-40	9
Juncus longistylis (long-styled rush)	3	0-3	4
Phalaris arundinacea (reed canarygrass)	20	0-20	4
Phleum pratense (common timothy)	1	0-1	9
Poa palustris (fowl bluegrass)	20	0-40	13
Poa pratensis (Kentucky bluegrass)	11	0-20	9
Polypogon monspeliensis (rabbitfoot polypogon)	20	0-20	4
Scirpus acutus (hardstem bulrush)	2	0-3	13
Forbs			
Alisma triviale (American waterplantain)	3	0-3	4
Arnica longifolia (longleaf arnica)	1	0-1	4
Arnica rydbergii (Rydberg's arnica)	1	0-1	4
Aster species (aster)	3	0-3	4
Callitriche hermaphroditica (autumnal water-starwort)	1	0-1	4
Chenopodium album (lambsquarter)	1	0-1	4
Cirsium arvense (Canada thistle)	1	0-1	4
Epilobium ciliatum (common willow-herb)	1	0-1	4
Galium trifidum (small bedstraw)	10	0-10	4
Hippuris vulgaris (common mare's-tail)	14	0-40	13
Melilotus alba (white sweet-clover)	20	0-20	4
Mentha arvensis (field mint)	5	0-10	35
Myosotis scorpioides (common forget-me-not)	10	0-10	4
Myriophyllum spicatum (spiked water-milfoil)	20	0-20	4
Nuphar luteum (yellow water-lily)	1	0-1	4
Oenothera breviflora (short-flowered evening-primrose)	2	0-3	9
Perideridia gairdneri (Gairdner's yampah)	1	0-1	4
Plantago major (common plantain)	7	0-20	13
Polygonum amphibium (water smartweed)	2	0-3	9
Polygonum hydropiperoides (waterpepper)	1	0-1	4
Potentilla anserina (common silverweed)	40	0-40	4
Potentilla gracilis (slender cinquefoil)	4	0-10	17
Potamogeton gramineus (grass-leaved pondweed)	20	0-20	4
Potentilla palustris (purple cinquefoil)	3	0-3	4
Potamogeton pectinatus (fennel-leafed pondweed)	10	0-10	4
Potentilla rivalis (brook cinquefoil)	3	0-3	4
Ranunculus aquatilis (white water-buttercup)	20	0-20	9
Ranunculus flammula (creeping buttercup)	25	0-30	9
Ranunculus macounii (Macoun's buttercup)	1	0-1	4
Ranunculus repens (creeping buttercup)	1	0-1	4
Ranunculus sceleratus (blister buttercup)	1	0-1	9
Ranunculus species (buttercup)	2	0-3	9
Rorippa sylvestris (creeping yellowcress)	30	0-30	4
Rumex crispus (curly dock)	1	0-1	9
Rumex maritimus (golden dock)	10	0-10	4

Table 75 (cont.)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Rumex obtusifolius (bitterdock)	3	0-3	4
Rumex salicifolius (willow dock)	2	0-3	17
Sagittaria cuneata (arumleaf arrowhead)	1	0-1	4
Senecio hydrophilus (alkali-marsh butterweed)	26	0-60	17
Sium suave (hemlock water-parsnip)	20	0-20	4
Sonchus arvensis (field milk-thistle)	20	0-20	4
Sparganium angustifolium (narrowleaf bur-reed)	10	0-10	4
Sparganium emersum (simplestem bur-reed)	11	0-20	9
Thlaspi arvense (field pennycress)	3	0-3	4
Trifolium hybridum (alsike clover)	20	0-20	4
Triglochin maritimum (seaside arrow-grass)	3	0-3	4
Trifolium repens (white clover)	40	0-40	4
Typha latifolia (common cattail)	1	0-1	4
Utricularia species (bladderwort)	10	0-10	4
Veronica anagallis-aquatica (water speedwell)	1	0-1	4
Veronica peregrina (Purslane speedwell)	1	0-1	4
Ferns and Allies			
Equisetum arvense (field horsetail)	10	0-10	4
Equisetum fluviatile (water horsetail)	1	0-1	4
Equisetum laevigatum (smooth scouring-rush)	3	0-3	4

SOILS

Sites are generally saturated or inundated with surface water for much of the growing season. Litter accumulations at the surface may blend into rich, black organic muck soils on some sites. Upper horizons, typically categorized as fine silts or clays, which may be 1 m (39 in) or more in depth, often arise from alluvial deposition. Sands, gravels, and cobbles usually constitute the main body of deeper subsurface materials. Soils orders may be classified as Histosols, Mollisols, and occasionally Entisols (Padgett and others 1989).

ADJACENT COMMUNITIES

Bulrushes and cattails may reside in deeper water adjacent to the *Eleocharis palustris* (common spikesedge) habitat type, while *Phalaris arundinacea* (reed canarygrass), *Juncus balticus* (Baltic rush), and sedges will occupy similar or slightly drier zones. *Glyceria* species (mannagrass) and *Wyethia* species (mule's-ears) establish mixed meadows where moisture is available along the edges of marshes or sloughs. Willows, *Populus tremuloides* (quaking aspen), and *Populus trichocarpa* (black cottonwood) form clusters and narrow, ribbon communities along active and older floodplains. *Artemisia tridentata* (big sagebrush) scrub/grasslands or *Pseudotsuga menziesii* (Douglas fir) forests may appear on adjacent hillsides and draws.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Seasonally wet conditions and low palatability of *Eleocharis palustris* (common spikesedge) limit the grazing value of this type for livestock, even during drought years when upland forage dries early and dies back (Kovalchik 1987), although use is probably slightly higher at these times.

Wildlife

Broad zones of this type along streams, rivers, lakes, and reservoirs provide valuable feeding and nesting areas for waterfowl. *Eleocharis palustris* (common spikesedge) and associated plants are a valuable source of food and cover for waterfowl (Hansen and others 1995). Wild ungulates seldom browse this habitat type due to its low palatability (Kovalchik 1987).

Soil Management and Rehabilitation Opportunities

Sites occupied by this type are typically inundated or at least saturated for much of the year as to preclude most development. Trampling damage and soil churning occurs readily with livestock use and may result in a shift toward more disturbance tolerant species such as *Hordeum jubatum* (foxtail barley), *Carex nebrascensis* (Nebraska sedge) or *Juncus balticus* (Baltic rush).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded to seasonally flooded.

OTHER STUDIES

Similar communities have been described by Kovalchik (1987), Ratliff (1982), Chadde and others (1988), Padgett and others (1989), and by Hansen and others (1995).

Glyceria grandis Habitat Type (American Mannagrass Habitat Type)

GLYGRA (GLGR)
Number of Stands Sampled = 2

LOCATION AND ASSOCIATED LANDFORMS

The *Glyceria grandis* (American mannagrass) habitat type is an incidental type at low to mid elevations in Idaho. Stand elevations range from 1,333 to 2,060 m (4,400 to 6,800 ft) with slopes ranging from 0 to 1 percent. This habitat type occupies shallow water or saturated zones on the margins of ponds and reservoirs, and floodplains along low-gradient streams. In some instances, it may be associated with wet meadows and sloughs.

VEGETATION

Glyceria grandis (American mannagrass) is a robust, rhizomatous graminoid capable of reaching heights of 200 cm (80 in) (Hitchcock and Cronquist 1973). It generally forms dense, essentially monotypic stands. Less homogeneous communities may exhibit a two-tiered structure with *Glyceria grandis* (American mannagrass) creating an upper canopy over a lower forb and graminoid component. Companion species, typically characterized by low coverages, may include *Agrostis stolonifera* (redtop) and *Epilobium* species (willow-herb) (Table 76).

Table 76. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Glyceria grandis* (American mannagrass) community type (number = 2 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Agrostis exarata (spike bentgrass)	3	0-3	50
Agrostis stolonifera (redtop)	10	0-10	50
Carex vesicaria (inflated sedge)	3	0-3	50
Glyceria grandis (American mannagrass)	90	90-90	100
Juncus balticus (Baltic rush)	1	0-1	50
Juncus nevadensis (Sierra rush)	3	0-3	50
Poa pratensis (Kentucky bluegrass)	3	0-3	50
Poa species (bluegrass)	1	0-1	50
Polypogon monspeliensis (rabbitfoot polypogon)	3	0-3	50
Forbs			
Epilobium ciliatum (common willow-herb)	1	0-1	50
Epilobium paniculatum (autumn willow-herb)	3	0-3	50
Mimulus guttatus (common monkey-flower)	1	0-1	50
Rumex crispus (curly dock)	3	0-3	50
Taraxacum officinale (common dandelion)	3	0-3	50
Trifolium species (clover)	3	0-3	50
Veronica americana (American speedwell)	3	0-3	50

SUCCESSIONAL INFORMATION

Carex rostrata (beaked sedge) may compete for similar locations on some sites. This habitat type could actually replace *Glyceria grandis* (American mannagrass) communities where changing environmental conditions favor its particular growth strategy. Appropriately, when conditions favor *Glyceria grandis* (American mannagrass), it may become the dominant community. Due to the saturated soils with water levels either above or near the soil surface throughout the growing season, sites may only be minimally impacted. However, heavy livestock use can convert stands of this type to the *Carex nebrascensis* (Nebraska sedge), *Hordeum jubatum* (foxtail barley), or *Agrostis stolonifera* (redtop) community types.

SOILS

Soils vary widely, and are thought to include Histosols, Mollisols (Aquolls), and Entisols (Aquents). Mineral soils typically have thick, mucky accumulations of organic material at the surface. They are usually poorly to very poorly drained. Water tables often remain above the soil surface throughout the summer. Soil reaction probably varies little from slightly acid to neutral (pH 6.0 to 7.0).

ADJACENT COMMUNITIES

Adjacent wet communities are typically dominated by *Carex rostrata* (beaked sedge). The *Glyceria grandis* (American mannagrass) habitat type may be associated with a variety of willow communities including: *Salix geyeriana* (Geyer willow), *Salix boothii* (Booth willow), *Salix lutea* (yellow willow), *Salix lasiandra* (Pacific willow) and *Salix exigua* (sandbar willow) types. *Alnus incana* (mountain alder) and *Betula occidentalis* (water birch) may be prevalent on some locations as well. *Artemisia* species (sagebrush) steppe or mixed grasslands are common on neighboring uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Glyceria species (mannagrass) is generally rated as highly palatable for livestock (USDA Forest Service 1937). Cattle and horses will consume both flowering stalks and leaves. Sheep tend to use only the leaves. Wet conditions tend to delay grazing until late in the season at which time the soils are normally drier and the forage is less succulent (Hansen and others 1988).

Wildlife
Glyceria grandis (American mannagrass) communities along lakes and ponds offer valuable habitat for waterfowl, and seeds provide good forage for ducks. Elk, moose, and deer may make moderate use of this habitat type.

Fire
Wildfire is rare in this habitat type.

Soil Management and Rehabilitation Opportunities
These sites are generally so wet as to preclude most development activities.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
The sites are generally so wet as to preclude most types of recreational uses except for fishing.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

Two additional classification systems that are being used to describe/define riparian and wetland ecosystems are listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

A *Glyceria borealis* (northern mannagrass) habitat type has been described by Jeglum and others (1974) for Ontario, Canada, and Hansen and others (1995) for Montana. A *Glyceria grandis* (American mannagrass) dominance type has been documented in Montana (Hansen and others 1988).

Hordeum jubatum Community Type
(Foxtail Barley Community Type)

HORJUB (HOJU)
Number of Stands Sampled = 6

LOCATION AND ASSOCIATED LANDFORMS

The *Hordeum jubatum* (foxtail barley) community type is an incidental type at low to mid elevations in eastern Idaho, ranging from 1,272 to 1,788 m (4,200 to 5,900 ft). This community type occurs most frequently in the drawdown zone of reservoirs or seasonal ponds with moderately saline or alkali water. This drawdown zone is flooded during the early part of the growing season but the water table falls to below the soil surface by late spring or early summer. The drawdown zone takes on the appearance of narrow bands encircling the open water. The soil surface may be covered with white salt crusts (Hansen and others 1995). *Hordeum jubatum* (foxtail barley) may also colonize wet meadows where surface water may be present for much of the growing season.

VEGETATION

The *Hordeum jubatum* (foxtail barley) community type is often characterized as by monotypic stands dominated by *Hordeum jubatum* (foxtail barley). On some sites, it may form a dense root network, creating a thick mat at the surface that excludes other species. However, depending on the types and levels of disturbance, a diversity of other graminoids and forbs may be associated with this type, although generally with low cover and constancy (Table 77).

Table 77. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Hordeum jubatum* (foxtail barley) community type (number = 6 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Agrostis stolonifera (redtop)	2	0-3	33
Eleocharis palustris (common spikesedge)	10	0-10	33
Hordeum jubatum (foxtail barley)	78	20-98	100

SUCCESSIONAL INFORMATION

Hordeum jubatum (foxtail barley) is an early successional, pioneer species establishing bands along the perimeter of ponds and reservoirs or wider swathes in wet meadow environments. *Eleocharis* species (spikesedge), *Scirpus acutus* (hardstem bulrush), and sedges may represent climax types on wetter sites. Hansen and others (1995) suggest that the *Hordeum jubatum* (foxtail barley) community type may represent an early/mid-seral grazing disclimax of the *Agropyron smithii* (western wheatgrass) habitat type in Montana. However, this successional pattern has not yet been established for Idaho. Careful observation of surrounding communities may provide insights to the potential climax vegetation.

SOILS

Soils probably classify to Mollisols, or possibly Entisols, on most sites. Soil textures are predominantly fines, commonly clays, silty clays, or silty clay loams. These poorly drained soils, in combination with seasonally high water tables, generally exhibit mottled or gleyed soil characteristics because of oxidation/reduction reactions common to these saturated environments. *Hordeum jubatum* (foxtail barley) appears tolerant of seasonal flooding and possibly long term inundation.

ADJACENT COMMUNITIES

Spikesedges, *Scirpus acutus* (hardstem bulrush), cattails, and sedges may occupy adjacent wetter zones. In many cases, the *Hordeum jubatum* (foxtail barley) community type inhabits sites abutting open water. *Betula occidentalis* (water birch) or willows may occur on the periphery of wet meadows associated with streams corridors. Adjacent drier communities are dominated by grasslands or *Artemisia tridentata* (big sagebrush) steppe.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production from the *Hordeum jubatum* (foxtail barley) community type is low. Palatability of *Hordeum jubatum* (foxtail barley) when young is fair for livestock, but little use occurs after seed heads develop (USDA Forest Service 1937, Johnson and Nichols 1982). Consuming the awned seed heads can cause severe mouth sores and occasionally death. Injuries to wildlife such as elk, deer, and pronghorn antelope have also been documented (USDA Forest Service 1937).

Hordeum jubatum (foxtail barley) acts as an increaser under excessive grazing pressure and quickly invades suitable sites (USDA Forest Service 1937). Moderate grazing may allow desired forage plants to regain dominance.

Wildlife

Low herbage production and palatability makes this community type of limited value for wildlife. Consuming the mature awned seed heads can cause severe mouth sores and occasionally death. Injuries to wildlife such as elk, deer, and pronghorn have also been documented (USDA Forest Service 1937).

Soil Management and Rehabilitation Opportunities

Most management concerns associated with this type are centered on the increasing saline seep problems. The presence or expansion of seep areas may indicate that upland vegetation, small grains, fallow fields, or excess irrigation are not allowing the water table to drop to levels these sites have routinely experienced in the past. Excess water then flows through the soil, gathering soluble salts before evaporating in depressions. The salts remain, increasing in concentration with time, thereby restricting the types of plants able to tolerate this environment. However, it is important to note that saline areas occur naturally due to the arid climate, parent material, and local topography (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

A similar community was described by Lesica and Shelly (1988) for the Blackfeet Indian Reservation, and Hansen and others (1995) for Montana.

Juncus balticus Community Type
(Baltic Rush Community Type)

JUNBAL (JUBA)
Number of Stands Sampled = 14

LOCATION AND ASSOCIATED LANDFORMS

The *Juncus balticus* (Baltic rush) community type is a minor type at low to mid elevations in riparian and wetland environments throughout southcentral and southeastern Idaho. Sites range from 1,333 to 1,757 m (4,400 to 5,800 ft). This type occurs near seeps/springs, in wet meadows, and on alluvial terraces where surface topography is usually level or sometimes undulating. *Juncus balticus* (Baltic rush) also colonizes the margins of reservoirs or ponds as narrow bands adjacent to open water.

VEGETATION

The *Juncus balticus* (Baltic rush) community type represents a grazing disclimax. *Juncus balticus* (Baltic rush) develops a dense, rhizomatous root network that excludes other species, resulting in monotype stands on most sites. Common disturbance-caused species associated with this type include *Hordeum jubatum* (foxtail barley) and *Agrostis stolonifera* (redtop) (Table 78).

Table 78. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Juncus balticus* (Baltic rush) community type (number = 14 stands)

Species	% Can. Cov. Avg.	Rng.	Con.
Graminoids			
Agrostis stolonifera (redtop)	12	0-40	29
Hordeum jubatum (foxtail barley)	17	0-60	36
Juncus balticus (Baltic rush)	78	30-98	100

SUCCESSIONAL INFORMATION

The *Juncus balticus* (Baltic rush) community type represents a grazing disclimax and occurs over a wide range of environmental conditions. Utilization of *Juncus balticus* (Baltic rush) may be partially responsible for the numerous invader species often associated with it. In other situations, *Juncus balticus* (Baltic rush) appears to have increased with disturbance, replacing other riparian or wetland graminoids. Due to its tolerance to grazing and ability to form dense, rhizomatous root mats, once established, *Juncus balticus* (Baltic rush) may be difficult to displace. The presence of nearly pure stands of *Juncus balticus* (Baltic rush) usually indicate wetter phases of this type on sites subject to historic, heavy grazing.

SOILS

Soils are classified as Mollisols (Aquolls and Borolls), or occasionally Entisols (Hansen and others 1995). Soil textures are variable and range from silts or clays to sandy loams. Previous years litterfall may be 6 inches deep on some sites. Fragments of coarse sand and gravel may be distributed throughout the soil solum on active floodplain sites. Fine and coarse gravels often dominate the underlying soil matrix. Water tables are often at or near the soil surface in early summer, but may drop below 50 cm (20 in) by late August. The presence of mottled and gleyed soil features indicate elevated water tables or potential inundation for extended periods. Soil reaction ranges from neutral to mildly alkaline (pH 7.0 to 8.0).

ADJACENT COMMUNITIES

A variety of types occupy adjacent wet sites, including the *Typha latifolia* (common cattail), *Scirpus acutus* (hardstem bulrush), *Eleocharis palustris* (common spikesedge), and *Carex rostrata* (beaked sedge) habitat types. The *Salix exigua* (sandbar willow) community type is also common on sites with similar or slightly drier moisture regimes. Uplands are typically vegetated with *Artemisia tridentata* (big sagebrush)/mixed grass shrublands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Stands of this community type are productive but forage value is relatively low. Hermann (1975) reported grazing use when plants were young and tender. As it matures, it is commonly avoided. Heavy grazing generally results in an increase of unpalatable forbs.

Wildlife

This type provides early season forage for wildlife, especially in stands with a large grass component.

Fisheries

Juncus balticus (Baltic rush) produces a deep and fibrous root system, with a mass of coarse and creeping rhizomes, and one established, rapidly spreads. These soil-holding characteristics may make it valuable for stabilizing streambanks.

Fire

Limited information on the effects of fire on *Juncus balticus* (Baltic rush) suggests that is not harmed by cool fires. Associated species such as *Poa pratensis* (Kentucky bluegrass) is damaged only by a hot, intense fire. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967). Intense burns during active growing periods can severely damage stands of *Poa pratensis* (Kentucky bluegrass) (Wasser 1982).

Soil Management and Rehabilitation Opportunities

The fine textured soils associated with this community type are subject to soil compaction and damage when moist, resulting in lower productivity and compositional changes that favor *Juncus balticus* (Baltic rush).

The strong rhizomes of *Juncus balticus* (Baltic rush) effectively stabilize streambanks, especially where soils are coarse and otherwise unstable. Except for *Juncus balticus* (Baltic rush), the associated graminoids of this type provide limited streambank protection.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

Two additional classification systems that are being used to describe/define riparian and wetland ecosystems are listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = saturated to temporarily flooded.

OTHER STUDIES

Other studies of the region have identified similar *Juncus balticus* (Baltic rush) communities, including Norton and others (1981), Mattson (1984), Youngblood and others

(1985b), Chadde and others (1988), Padgett and others (1989), and Hansen and others (1995).

Phalaris arundinacea Habitat Type (Reed Canarygrass Habitat Type)

PHAARU (PHAR3)
Number of Stands Sampled = 12

LOCATION AND ASSOCIATED LANDFORMS

The *Phalaris arundinacea* (reed canarygrass) habitat type is a minor type in southern and eastern Idaho. It occurs at low to mid elevations, ranging from 1,030 to 1,697 m (3,400 to 5,600 ft). This type is located along streams, rivers, oxbows, lake and pond margins, ditches, irrigation channels, and in wet meadows. Although a native species, *Phalaris arundinacea* (reed canarygrass) has been widely distributed for the purposes of forage, and readily escapes from pastures into riparian or wetland areas, displacing more desirable species (Hansen and others 1995).

VEGETATION

Phalaris arundinacea (reed canarygrass) may reach heights of 2 m (6.5 ft) or more and often forms dense, rhizomatous root mats in the upper few inches of the soil solum. Coupled with the seasonal dieback of leaves and stalks, which form a thick carpet of litter over the ground surface, *Phalaris arundinacea* (reed canarygrass) is able to form dense, monotypic stands, virtually excluding other riparian species. The occasional graminoids and forbs that are found on sites are poorly represented and exhibit low vigor (Table 79).

Table 79. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Phalaris arundinacea* (reed canarygrass) habitat type (number = 12 stands)

Species	% Can. Cov. Avg.	 Rng.	Con.
Graminoids			
Agrostis stolonifera (redtop)	3	0-10	33
Phalaris arundinacea (reed canarygrass)	89	10-98	100
Poa pratensis (Kentucky bluegrass)	5	0-10	25

SUCCESSIONAL INFORMATION

Hansen and others (1995) note that *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. However, if stands are severely impacted, species such as *Bromus inermis* (smooth brome) and *Mentha arvensis* (field mint) may invade sites. Increasing water levels due to beaver activity or other impoundments may shift sites from the *Phalaris arundinacea* (reed canarygrass) habitat type to deep-water types dominated by *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush).

SOILS

Surface soils are fine textured, typically clays, silty clay loams, and loams, with pH measurements ranging from 6.5 (slightly acid) to 8.0 (moderately alkaline) (USDA Soil Conservation Service 1968). Upper horizons, which may be 1 m (39 in) or more in depth and contain a significant organic component, often appear as thick, black muck soils where standing water is present. Underlying substrates are dominated by sands, gravels, cobbles, and even rock. Soils are probably classified as Entisols (Fluvents) or Mollisols. Water tables may be at or above the ground surface throughout the early part of the growing season, although may drop below 30 cm (12 in) towards the later summer months. Mottled and gleyed soil features are common in the upper horizons. *Phalaris arundinacea* (reed canary grass) tolerates prolonged periods of flooding and may be one of the most flood-tolerant of the cultivated grasses, yet is capable of withstanding short summer droughts (Apfelbaum and Sams 1987).

ADJACENT COMMUNITIES

Carex rostrata (beaked sedge), *Typha latifolia* (common cattail), *Scirpus acutus* (hardstem bulrush), and *Eleocharis palustris* (common spikesedge) habitat types may form a patchwork mosaic with *Phalaris arundinacea* (reed canarygrass) communities along the margins of lakes and ponds or paralleling stream channels or oxbows. Scattered *Populus trichocarpa* (black cottonwood) stands may appear throughout the upper floodplains and on islands. A variety of shrubs, such as *Cornus stolonifera* (red-osier dogwood), *Crataegus douglasii* (black hawthorn), and willows may develop as narrow ribbon communities adjacent to riparian corridors. Drier hillsides and secondary floodplains may consist of mixed grasslands and *Artemisia tridentata* (big sagebrush) shrubs.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) indicate that although herbage production from this habitat type is high, the palatability of the coarse-leaved *Phalaris arundinacea* (reed canarygrass) is only low to moderate. It is most palatable when actively growing, and becomes less palatable in fall and winter. *Phalaris arundinacea* (reed canarygrass) has a strong tolerance to grazing except in the early growth stages. Alkaloidal content and increasing fiber content with advancing maturity cause a gradual decline in palatability during the growing season. Grazing should begin when this species is about 30 cm (12 in) tall and soils have dried enough to minimize trampling damage

(USDA Soil Conservation Service 1968). It is suggested that livestock operators graze it using an intense stocking and short rotation plan that leaves at least a 2-3 cm (5-8 in) stubble. Management may include mowing stands once a year and fencing to force cattle to consume *Phalaris arundinacea* (reed canarygrass). To maintain dense stands, plants should not be grazed to less than 10 cm (4 in) in height (Alberta Agriculture 1981).

This type is also suitable for hay production. However, harvest must usually be delayed until late in the season when soils are dry and plants mature. Nutritive quality at this time is low, especially where *Phalaris arundinacea* (reed canarygrass) completely dominates the stand (Hansen and others 1995).

Wildlife
In many locations, the *Phalaris arundinacea* (reed canarygrass) habitat type is inundated long enough to provide limited nesting habitat for waterfowl and cover for muskrats. Stands of this habitat type are also used by big game, especially moose, for forage and cover (Hansen and others 1995).

Fisheries
This habitat type may provide valuable spawning areas and hiding cover for many species of fish (Hansen and others 1995).

Fire
High water tables during the growing season make burning difficult. However, burning during the nongrowing season may be feasible. Fire management strategies based on two to three year burn rotations has shown limited success in controlling the spread of *Phalaris arundinacea* (reed canarygrass) (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
These sites are generally so wet as to preclude most development activities. Even sites that dry out near the end of the growing season are highly susceptible to compaction problems due to fine textured soils (Hansen and others 1995). Mosquito populations are generally high in these areas as well where standing or stagnant water provides prime breeding grounds.

Once established, *Phalaris arundinacea* (reed canarygrass) spreads rapidly and is extremely difficult to eliminate (Apfelbaum and Sams 1987). The resilient nature of this rhizomatous grass makes it an effective stabilizer of streambanks and ditches. ***However, its future use in revegetating degraded sites should be severely restricted.*** *Phalaris arundinacea* (reed canarygrass) is becoming a threat to wetland areas dominated by other native species. The effectiveness of control measures, such as burning and herbicide spraying, has not been determined. Chemical methods usually provide poor long-term control and are not always acceptable. The proximity of water tables creates a high potential for water contamination. Even when chemical and mechanical control treatments are used, new seedlings can rapidly reestablish themselves from seeds in the soil (Hansen and others 1995).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

This type has been documented in the *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen and others 1995).

Phragmites australis Habitat Type
(Common Reed Habitat Type)

PHRAUS (PHAU7)
Number of Stands Sampled = 10

LOCATION AND ASSOCIATED LANDFORMS

The *Phragmites australis* (common reed) habitat type is an incidental type at mid to lower elevations throughout southern and eastern Idaho, ranging from 970 to 1,600 m (3,200 to 5,280 ft). It occurs in swales, marshes, pond and reservoir margins, oxbow lakes, backwater areas, and on the banks of rivers and streams. Sites are classified as seasonally flooded (Hansen and others 1995)

VEGETATION

Phragmites australis (common reed) is a strongly rhizomatous perennial that can attain heights of 3 m (10 ft). Shading, stand density and an extensive leaf litter layer prohibit the invasion of other species, resulting in essentially monotypic stands. Some stands may be quite extensive in marshes and swales while other stands may appear as narrow swaths paralleling stream and river corridors. Understory graminoids and forbs, which may be more prevalent where disturbance occurs or at the edge of ecotones, include *Nepeta cataria* (catnip) and *Rumex crispus* (curly dock) (Table 80).

Table 80. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Phragmites australis* (common reed) habitat type (number = 7 stands)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Shrubs			
Ribes setosum (Missouri gooseberry)	1	0-1	14
Rosa woodsii (woods rose)	1	0-1	14
Salix exigua (sandbar willow)	1	0-1	14
Solanum dulcamara (climbing nightshade)	2	0-3	43
Graminoids			
Agropyron caninum (bearded wheatgrass)	1	0-1	14
Carex stipata (sawbeak sedge)	1	0-1	14
Dactylis glomerata (orchard-grass)	1	0-1	14
Hordeum jubatum (foxtail barley)	3	0-3	14
Phalaris arundinacea (reed canarygrass)	1	0-1	14
Phragmites australis (common reed)	98	98-98	100
Poa pratensis (Kentucky bluegrass)	3	0-3	14
Polypogon monspeliensis (rabbitfoot polypogon)	1	0-1	14
Forbs			
Apocynum cannabinum (hemp dogbane)	1	0-1	14
Aster eatonii (Eaton's aster)	3	0-3	14
Berula erecta (cut-leaved water-parsnip)	3	0-3	14
Chenopodium album (lambsquarter)	1	0-1	29
Cicuta maculata (spotted water-hemlock)	3	0-3	14
Cirsium arvense (Canada thistle)	2	0-3	43
Descurainia sophia (flixweed tansymustard)	3	0-3	14
Epilobium ciliatum (common willow-herb)	3	0-3	14
Lactuca serriola (prickly lettuce)	1	0-1	14
Lepidium perfoliatum (clasping pepperweed)	3	0-3	14
Nepeta cataria (catnip)	1	0-1	29
Rorippa palustris (marsh yellowcress)	1	0-1	14
Rumex crispus (curly dock)	1	0-1	29
Solidago missouriensis (Missouri goldenrod)	3	0-3	14
Tragopogon dubius (goat's beard)	1	0-1	14
Urtica dioica (stinging nettle)	1	0-1	14
Veronica anagallis-aquatica (water speedwell)	1	0-1	14

SUCCESSIONAL INFORMATION

Phragmites australis (common reed) is strongly rhizomatous and tends to out compete all but the most aggressive disturbance-induced herbaceous species. However, with increased disturbance, weedy species such as *Cirsium arvense* (Canada thistle) may invade the understory (Table 81). *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) generally occupy adjoining sites and appear to compete with *Phragmites australis* (common reed), although the specific physical site requirements that allow one community to dominate over another in a particular location is unclear.

Table 81. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Phragmites australis* (common reed) habitat type (number = 3 stands)

Species	% Can. Cov.		
	Avg.	Rng.	Con.
Graminoids			
Carex laeviconica (smooth sedge)	20	0-20	33
Phragmites australis (common reed)	80	80-80	100
Forbs			
Cirsium arvense (Canada thistle)	20	0-20	33
Glycyrrhiza lepidota (American licorice)	20	0-20	33
Melilotus alba (white sweet-clover)	20	0-20	33
Rumex crispus (curly dock)	20	0-20	33

SOILS

Soils are generally classified as Entisols (Aquents) and Mollisols (Aquolls) (Hansen and others 1995). Soil textures range from clays to sandy loams, and often exhibit mottled or gleyed anaerobic characteristics due to prolonged flooding common on most sites. Sands, or potentially gravels and cobbles, comprise the subsurface horizons. Leaf and stalk litter from previous years may accumulate to depths of 10 cm (4 in) or more on some locations.

Water tables may fluctuate significant, particularly in drawdown areas, ranging from 50 cm (20 in) above the surface to 1 m (39 in) below by the end of the growing season.

ADJACENT COMMUNITIES

Typha latifolia (common cattail), sedges, and *Scirpus acutus* (hardstem bulrush) habitat types frequently occupy adjacent wet zones. In some cases, *Phragmites australis* (common reed) communities may border open water. Slightly drier zones are dominated by stands of willows, *Betula occidentalis* (water birch), or even cottonwood. *Agrostis stolonifera* (redtop), *Agropyron* species (wheatgrass), and *Poa pratensis* (Kentucky bluegrass) mixed grasslands, punctuated with sporadic *Juniperus scopulorum* (Rocky Mountain juniper) and *Artemisia* species (sagebrush), inhabit adjacent hillsides and valleys.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock
Hitchcock and others (1969) indicate that *Phragmites australis* (common reed) is too coarse to be a valuable forage species. However, Hansen and others (1995) state that herbage production in the *Phragmites australis* (common reed) habitat type is high to very high, and that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. They suggest that *Phragmites australis* (common reed) is moderately tolerant of grazing, although heavy grazing pressure may reduce the size and extent of stands. *Phragmites australis* (common reed) may also produce good quality hay or silage.

Wildlife
Hansen and others (1995) report that *Phragmites australis* (common reed) is highly palatable to both livestock and wildlife, especially when the plants are young and growing vigorously. The high structural diversity of *Phragmites australis* (common reed) provides excellent thermal and hiding cover for big game species and waterfowl may use this habitat type for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are also common inhabitants.

Fisheries
The rhizomatous root network of *Phragmites australis* (common reed) provides exceptional streambank stabilization while the dense shoot growth slows high flows and helps trap and filter sediments from water columns (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Phragmites australis (common reed) can provide excellent streambank protection. Rhizomes hold and stabilize the bank while the above ground vegetation helps trap and filter sediments. Once established, these characteristics help to stabilize sites (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

Recreational Uses and Considerations
The *Phragmites australis* (common reed) habitat type provides excellent opportunities for viewing wildlife. Hitchcock and others (1969) note that this type may be used for thatching and matting as well.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded to saturated.

OTHER STUDIES

Similar communities were described by Ward (1942), Walker and Waygood (1968), Shay and Shay (1986), and Hansen and others (1995).

Poa pratensis Community Type
(Kentucky Bluegrass Community Type)

POAPRA (POPR)
Number of Stands Sampled = 10

LOCATION AND ASSOCIATED LANDFORMS

The *Poa pratensis* (Kentucky bluegrass) community type is an incidental type across broad, level valleys and foothills of southern and eastern Idaho. Sites range in elevation from 1,455 to 1,909 m (4,800 to 6,300 ft). Stands occur on generally drier, marginally riparian zones of upper stream and riverine floodplains that have been influenced by severe, often long-term disturbance, such as historic grazing.

VEGETATION

A native of Eurasia, *Poa pratensis* (Kentucky bluegrass) is widely used for lawns and hay meadows and has become naturalized across most of North America (Kovalchik 1987). The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax and is often associated with a variety of other "weed" species. *Poa pratensis* (Kentucky bluegrass) will typically represent the dominant species on these stands, although, depending on the site and general region, the composition of "weed" species and other species will differ (Table 82). This community type occupies marginally riparian zones and is considered one of the drier riparian types in Idaho.

Table 82. Average canopy cover, range of canopy cover, and constancy for indicator species and those species recorded in 25 percent or more of the sampled stands of the grazing disclimax *Poa pratensis* (Kentucky bluegrass) community type (number = 10 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Agropyron caninum (bearded wheatgrass)	2	0-3	40
Agrostis stolonifera (redtop)	9	0-20	30
Juncus balticus (Baltic rush)	25	0-60	50
Phleum pratense (common timothy)	7	0-20	50

Table 82 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Poa pratensis (Kentucky bluegrass)	63	20-90	100
Forbs			
Achillea millefolium (common yarrow)	3	0-3	40
Aster occidentalis (western aster)	2	0-3	30
Cirsium arvense (Canada thistle)	5	0-20	50
Cirsium scariosum (elk thistle)	2	0-3	30
Potentilla gracilis (slender cinquefoil)	5	0-20	50
Solidago canadensis (Canada goldenrod)	1	0-1	30
Taraxacum officinale (common dandelion)	2	0-3	30
Ferns and Allies			
Equisetum laevigatum (smooth scouring-rush)	2	0-3	40

SUCCESSIONAL INFORMATION

The *Poa pratensis* (Kentucky bluegrass) community type represents a grazing disclimax in an early/mid-seral secondary successional stage. Overgrazing by herbivores drastically alters conditions on sites formerly dominated by native graminoids (Volland 1978). Once a suitable site is disturbed, the extensive rhizomatous system of *Poa pratensis* (Kentucky bluegrass) allows it to rapidly spread and establish on these areas. It also withstands high levels of utilization, making replacement by former dominants unlikely. Close observation of similar sites may offer insight to the climax community for these sites (Hansen and others 1995).

SOILS

Youngblood and others (1985) indicate that this type typically establishes on Mollisols (Borolls) or Entisols (Fluvents). *Poa pratensis* (Kentucky bluegrass) survives on sands, dense clays, and thin, rocky soils when adequate moisture is available, but exhibits the greatest vigor on moist, fertile sandy to clay alluvial soils with a high organic component. *Poa pratensis* (Kentucky bluegrass) is generally intolerant of prolonged flooding, seasonally high water tables, or poor drainage. It is tolerant of mildly alkaline (pH 8.0) and saline soils (Hansen and others 1995).

ADJACENT COMMUNITIES

Cottonwood stands often appear in scattered clusters or as extensive forests on upper floodplains adjacent to this type. Disturbance tolerant shrubs such as *Crataegus douglasii* (black hawthorn), *Rosa* species (rose), and *Symphoricarpos occidentalis* (western snowberry) may also be present. Willows, *Carex rostrata* (beaked sedge), and *Juncus balticus* (Baltic rush) types typically colonize streambanks on less disturbed, saturated sites. Upland communities are dominated by mixed grasslands, often with a significant *Artemisia tridentata* (big sagebrush) or *Juniperus scopulorum* (Rocky Mountain juniper) element.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Hansen and others (1995) note that the *Poa pratensis* (Kentucky bluegrass) community type is moderately productive, and provides a significant amount of early season forage. It is highly palatable in the rapid growth phase with palatability becoming greatly reduced during semidormancy of late summer and winter. Fall regrowth can occur provided moisture is sufficient and temperatures remain above freezing. *Poa pratensis* (Kentucky bluegrass) is well adapted to grazing and is considered an increaser or an invader, especially if grazing intensities and durations are severe (Wasser 1982). This species can produce new shoots from both existing tillers and rhizomes. Grazing practices influence the type of growth form present (Volland 1978). A high density of weak, low vigor tillers results under season long grazing. Grazing practices incorporating early season rest increase the vigor of individual plants. Fewer shoots may be produced, but total aboveground biomass tends to be greater. Streambanks associated with *Poa pratensis* (Kentucky bluegrass) stands are susceptible to sloughing (Hansen and others 1995).

Wildlife

Elk and deer make use of the grasses and forbs of this type, especially in early spring when other forages have not yet greened. Waterfowl utilize *Poa pratensis* (Kentucky bluegrass) for food and cover. Upland game birds, small mammals, and small nongame birds use this type for cover (Dittberner and Olson 1983).

Fisheries

The *Poa pratensis* (Kentucky bluegrass) community type is not very effective in stabilizing streambanks due to the shallow rhizomatous root system (Youngblood and others 1985b). Bank undercutting and sloughing may occur, especially when soils are wet or stands weakened by excessive grazing.

Fire

Hansen and others (1995) indicate that *Poa pratensis* (Kentucky bluegrass) is well adapted to fire, and is able to quickly resprout following burning because of its extensive network of rhizomes. However, it is intolerant of burning during the active growth stages and can be successfully controlled by late spring burning. Fire is an effective tool to remove excessive litter accumulations common on rested or lightly grazed stands. Cool burns will have little effect on *Poa pratensis* (Kentucky bluegrass) (Volland and Dell 1981), but spring burns may lower tiller densities (Dix and Smeins 1967).

Soil Management and Rehabilitation Opportunities
The potential for soil compaction is greatest in the spring when soils are moist. *Poa pratensis* (Kentucky bluegrass) has an extensive rhizome system, but its shallow rooting characteristics make it only marginally effective in stabilizing streambanks. The potential for erosional problems associated with this community type can be quite high. Managers need to pay close attention to streambanks associated with *Poa pratensis* (Kentucky bluegrass) community type in order to detect early signs of streambank collapse. Once the streambank starts to degrade, with no change in management, there is little that can be done to save it short of expensive riprap (Hansen and others 1995).

Unless water tables are restored, these sites will remain with a ground cover dominated by introduced grass species. On those sites adjacent to a first or second order stream, the use of rock checkdams to aid in the rehabilitation of degraded (de-watered) sites is an excellent cost effective approach. The rock dam will help raise the water table thereby allowing the willows and sedges to reclaim a degraded site.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = temporarily flooded.

OTHER STUDIES

A number of other researchers have identified similar *Poa pratensis* (Kentucky bluegrass) communities, including Norton (1981; Greys River, Wyoming), Ratliff (1982; Sierra Nevada, California), Youngblood and others (1985b; eastern Idaho and western Wyoming), Padgett and others (1989; Utah and southeastern Idaho), and Hansen and others (1995; Montana).

Polygonum amphibium Community Type
(Water Smartweed Community Type)

POLAMP (POAM8)
Number of Stands Sampled = 10

LOCATION AND ASSOCIATED LANDFORMS

The *Polygonum amphibium* (water smartweed) community type is an incidental type at low to mid elevations in southern and eastern Idaho, ranging from 1,394 to 1,515 m (4,600 to 5,000 ft). This community type occupies both shallow and deeper waters, and drawdown zones, along the edges of reservoirs, lakes, and ponds. It may colonize saturated or inundated sites in marshes, sloughs, and other wet areas as well. Sites are classified as seasonally flooded (Hansen and others 1995)

VEGETATION

The *Polygonum amphibium* (water smartweed) community type is an aggressive invader of shallow water and exposed mud flats where there is minimal wave action (Hansen and others 1995). A partially decumbent growth form and numerous stolons often result in the formation of dense, monotypic stands. Associated species may include *Polygonum hydropiperoides* (waterpepper) and *Rumex crispus* (curly dock) (Table 83).

Table 83. Average canopy cover, range of canopy cover, and constancy for species recorded in stands of the *Polygonum amphibium* (water smartweed) community type (number = 10 stands) that are relatively undisturbed by livestock or wildlife

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Beckmannia syzigachne (American sloughgrass)	20	0-20	10
Eleocharis palustris (common spikesedge)	1	0-1	20
Hordeum jubatum (foxtail barley)	3	0-3	10
Scirpus species (bulrush)	1	0-1	10
Forbs			
Alisma gramineum (narrowleaf waterplantain)	1	0-1	10
Polygonum amphibium (water smartweed)	92	80-98	100
Polygonum hydropiperoides (waterpepper)	3	0-3	10
Rumex crispus (curly dock)	3	0-3	10

SUCCESSIONAL INFORMATION

The *Polygonum amphibium* (water smartweed) community type may represent an early seral stage for a host of climax communities. *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush) may prevail in deep water sites, while *Eleocharis palustris* (common spikesedge) or sedges may succeed *Polygonum amphibium* (water smartweed) on shallower, saturated sites. Physical site parameters and neighboring communities should aid in the identification of the potential climax community for most sites.

SOILS

Water tables occur at or above the ground surface throughout most of the year on sites occupied by the

Polygonum amphibium (water smartweed) community type. Surface soils are typically nutrient rich, black mucky clays with a high organic component, although Hansen and others (1995) indicate that this type may establish on a variety of soils with textures ranging from fine clays to sandy loams. It is considered intolerant of saline or alkaline conditions. Soils types should classify to Mollisols, or possibly Histosols or Entisols. Decaying plant material accumulates on the surface or is mixed with the upper horizons. Mottled and gleyed and soil features are common throughout the soil solum.

ADJACENT COMMUNITIES

Typha latifolia (common cattail) or *Scirpus acutus* (hardstem bulrush) habitat types may colonize zones in slightly deeper water, although stands of *Polygonum amphibium* (water smartweed) ordinarily appear immediately adjacent to open water. *Eleocharis palustris* (common spikesedge) is typically associated with this community type in shallow water while willows form small clustered stands just above the high water mark. Adjacent uplands may be dominated by *Artemisia tridentata* (big sagebrush)/grasslands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production of the *Polygonum amphibium* (water smartweed) community type rates low to moderate. *Polygonum amphibium* (water smartweed) is of low palatability to livestock and wildlife (Hansen and others 1995).

Wildlife

Polygonum amphibium (water smartweed) is of low palatability to wildlife (Hansen and others 1995), although waterfowl appear to use these areas for nesting, shelter and forage.

Soil Management and Rehabilitation Opportunities

Shore vegetation around reservoirs is a mosaic of short-lived plant communities that may survive from one to many years before being eliminated by a combination of high water or grazing. These shore communities are composed primarily of early successional species that become established during either the fall or spring when water levels are low. Repeated annual drawdowns perpetuate this disturbance and associated vegetation. Shore vegetation is important in providing habitat for terrestrial wildlife, certain fish species, and livestock. These communities also protect shores from accelerated erosion, and enhance the aesthetic quality of the shore environment (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

A number of authors have described similar communities for the prairie pothole region of North America (Van der Valk 1989). Hansen and others (1995) have also described this type for Montana,

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Scirpus acutus Habitat Type
(Hardstem Bulrush Habitat Type)

SCIACU (SCAC)
Number of Stands Sampled = 29

NOTE: The *Scirpus acutus* (hardstem bulrush) habitat type includes all combinations of *Scirpus acutus* (hardstem bulrush) and *Scirpus validus* (softstem bulrush) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus acutus* (hardstem bulrush) habitat type, ranging in elevation from 909 to 1,576 m (3,000 to 5,200 ft), is a major type occurring throughout southern and eastern Idaho. Stands may appear as fringes along the margins of ponds, lakes and reservoirs, narrow ribbons paralleling stream and river channels, or broad patches in backwater marshes and sloughs. This habitat type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

VEGETATION

The *Scirpus acutus* (hardstem bulrush) habitat type usually appears as an impenetrable monotypic stand often reaching heights of 2 m (6.5 ft) or more. Bulrushes require high levels of moisture throughout the year, and while stands may colonize saturated soils along streambanks or on the periphery of ponds and reservoirs, they typically extend out into the water column up to 1 m (39 in) or more in depth in some locations. Due to the dense growth form and flooded water regime, other species are largely absent, or if present, in limited amounts (Table 84).

Table 84. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Scirpus acutus* (hardstem bulrush) habitat type (number = 18 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Salix exigua (sandbar willow)	1	0-1	6
Solanum dulcamara (climbing nightshade)	2	0-3	22
Graminoids			
Agrostis stolonifera (redtop)	1	0-1	6
Carex species (sedges)	1	0-1	6
Carex lanuginosa (woolly sedge)	1	0-1	6
Carex rostrata (beaked sedge)	12	0-20	11
Eleocharis palustris (common spikesedge)	7	0-20	17
Eleocharis rostellata (beaked spike-rush)	20	0-20	6
Grass	1	0-1	6
Juncus balticus (Baltic rush)	1	0-1	6
Phalaris arundinacea (reed canarygrass)	1	0-1	6
Polypogon monspeliensis (rabbitfoot polypogon)	1	0-1	6
Scirpus acutus (hardstem bulrush)	85	0-98	94
Scirpus validus (softstem bulrush)	45	0-80	11
Forbs			
Chenopodium album (lambsquarter)	3	0-3	6
Cirsium arvense (Canada thistle)	1	0-1	6
Epilobium ciliatum (common willow-herb)	1	0-1	11
Erigeron glabellus (smooth daisy)	3	0-3	6
Helianthus nuttallii (Nuttall's sunflower)	1	0-1	6
Lepidium virginicum (tall pepperweed)	1	0-1	6
Mentha arvensis (field mint)	7	0-20	17
Myriophyllum spicatum (spiked water-milfoil)	1	0-1	6
Polygonum amphibium (water smartweed)	12	0-60	33
Potamogeton species (pondweed)	1	0-1	6
Potentilla anserina (common silverweed)	1	0-1	6
Rorippa curvipes (blunt-leaved yellowcress)	1	0-1	6
Rumex crispus (curly dock)	1	0-1	11
Triglochin maritimum (seaside arrow-grass)	1	0-1	6
Typha angustifolia (lesser cattail)	3	0-3	6
Typha latifolia (common cattail)	3	0-3	17

SUCCESSIONAL INFORMATION

Scirpus acutus (hardstem bulrush) occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian communities. These highly saturated conditions, coupled with an extremely dense growth form, allow this aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. However, *Scirpus acutus* (hardstem bulrush) is regularly accompanied by other hydrophilic species, such as *Typha latifolia* (common cattail), sedges, and other species of bulrush (Table 85). The reasons for the distribution of these species is difficult to discern, but minor changes in water chemistry or nutrient availability may favor the expansion of one species at the expense of another. Seasonal climatic changes may also play a critical role in determining which species may dominate a site at a particular point in time.

Table 85. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Scirpus acutus* (hardstem bulrush) habitat type (number = 11 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Salix lutea (yellow willow)	1	0-1	9
Solanum dulcamara (climbing nightshade)	3	0-3	9
Graminoids			
Agrostis stolonifera (redtop)	30	0-30	9
Carex lanuginosa (woolly sedge)	20	0-20	9
Carex nebrascensis (Nebraska sedge)	3	0-3	9
Carex rostrata (beaked sedge)	3	0-3	18
Eleocharis palustris (common spikesedge)	10	0-10	9
Eleocharis pauciflora (few-flowered spike-rush)	20	0-20	9
Juncus balticus (Baltic rush)	3	0-3	9
Phalaris arundinacea (reed canarygrass)	3	0-3	9
Phragmites australis (common reed)	80	0-80	9
Polypogon monspeliensis (rabbitfoot polypogon)	1	0-1	9
Scirpus acutus (hardstem bulrush)	31	10-80	100
Forbs			
Aster brachyactis (rayless alkali aster)	1	0-1	9
Aster chilensis (long-leaved aster)	1	0-1	9
Aster eatonii (Eaton's aster)	3	0-3	9
Cicuta maculata (spotted water-hemlock)	1	0-1	18
Cirsium arvense (Canada thistle)	1	0-1	9
Epilobium ciliatum (common willow-herb)	2	0-3	36
Erigeron acris (bitter fleabane)	1	0-1	9
Gentianella detonsa (smaller fringed gentian)	1	0-1	9
Helianthus nuttallii (Nuttall's sunflower)	1	0-1	9

Table 85 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Mentha arvensis (field mint)	5	0-10	27
Menyanthes trifoliata (buckbean)	30	0-30	9
Polygonum amphibium (water smartweed)	1	0-1	9
Potamogeton species (pondweed)	40	0-40	9
Potentilla gracilis (slender cinquefoil)	4	0-10	27
Rumex crispus (curly dock)	1	0-1	9
Solidago occidentalis (western goldenrod)	10	0-10	9
Taraxacum officinale (common dandelion)	3	0-3	9
Triglochin maritimum (seaside arrow-grass)	14	0-20	27
Typha latifolia (common cattail)	3	0-3	9
Utricularia species (bladderwort)	20	0-20	9
Utricularia vulgaris (common bladderwort)	1	0-1	9
Veronica anagallis-aquatica (water speedwell)	1	0-1	9
Ferns and Allies			
Equisetum fluviatile (water horsetail)	7	0-10	18

SOILS

The *Scirpus acutus* (hardstem bulrush) habitat type generally inhabits soils classified as Mollisols (Aquolls), Entisols (Aquents), or occasionally Histosols (Brichta 1987). Textures of surface horizons on long-lived stands are predominantly fines, which appear as black or gleyed, mucky clay or silty loam soils with high concentrations of decomposed and partially decomposed plant material that accumulate over time from annual dieback. Alluvial sands, gravels, and cobbles may form an unconsolidated matrix in the subsurface horizons. Water tables are generally at or above the soil surface throughout the growing season. Soil reactions on sites occupied by this type vary from almost neutral to moderately alkaline (pH 7.4 to 8.2) (Brichta 1987).

ADJACENT COMMUNITIES

Sedges, *Typha latifolia* (common cattail), *Phragmites australis* (common reed), *Eleocharis palustris* (common spikesedge), *Phalaris arundinacea* (reed canarygrass) and *Scirpus acutus* (hardstem bulrush) may form a patchwork mosaic of communities along the margins of reservoirs and ponds, or parallel stream channels or oxbows. These communities generally occupy microsites according to moisture regimes, substrate composition, nutrient availability, and a variety of other physical site parameters. Willows occupy slightly drier sites at the waterline while *Elaeagnus angustifolia* (Russian olive) and *Populus trichocarpa* (black cottonwood) appear in scattered communities on upper floodplains. Hayfields and pastureland may represent the dominate upland communities, although *Artemisia tridentata* (big sagebrush)/grasslands are also common.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Wet conditions and the lack of palatable forage limit livestock use of this type. However, if upland forage becomes sparse and soil conditions dry, livestock may make use of *Scirpus acutus* (hardstem bulrush) (Hansen and others 1995).

Wildlife

Scirpus acutus (hardstem bulrush) provides valuable nesting and roosting cover for a variety of songbirds and waterfowl, notably redwinged, yellow-headed blackbirds and wrens. *Scirpus acutus* (hardstem bulrush) is a staple food for muskrats and is used in construction of their huts. Seeds of *Scirpus acutus* (hardstem bulrush) are eaten by a variety of birds. Waterfowl managers often attempt to increase the proportion of *Scirpus acutus* (hardstem bulrush) relative to cattail as a means of improving habitat. *Triglochin maritimum* (seaside arrow-grass), if present, may be heavily grazed by elk (Hansen and others 1995).

Fire

The *Scirpus acutus* (hardstem bulrush) habitat type will burn in either late fall or early spring if the water levels have dropped sufficiently (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

Soils are commonly wet throughout the growing season and easily damaged from trampling by livestock and wildlife. Vegetation can also be damaged by trampling.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

OTHER STUDIES

Similar communities dominated by *Scirpus acutus* (hardstem bulrush) have been identified by Pierce and Johnson (1986) for west central Montana, by Hansen and others (1995) for the state of Montana, and by Chadde and others (1988) for northern Yellowstone National Park.

Scirpus pungens Habitat Type
(Sharp Bulrush Habitat Type)

SCIPUN (SCPU3)
Number of Stands Sampled = 16

NOTE: The *Scirpus pungens* (sharp bulrush) habitat type includes all combinations of *Scirpus pungens* (sharp bulrush) and *Scirpus americanus* (American bulrush) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Scirpus pungens* (sharp bulrush) habitat type is an incidental type inhabiting broad, riverine valleys across southcentral and eastern Idaho. Sites are located in wet areas along the margins of marshes and ponds or in backwater areas of floodplains proximal to streams and rivers. Sites range in elevation from 1,121 to 1,697 m (3,700 to 5,600 ft). This type often inhabits relatively deep water and represents one of the wettest riparian types in Idaho.

VEGETATION

The *Scirpus pungens* (sharp bulrush) habitat type usually forms dense stands, up to 1 m (39 in) tall (Hitchcock and others 1969), that may be dominated by *Scirpus pungens* (sharp bulrush) or *Scirpus americanus* (American bulrush). Although both species may be present, they do not appear to codominate sites; there is generally only one dominant species. The rhizomatous root network and saturated site conditions often preclude the invasion of other species, resulting in monotypic stands essentially devoid of other graminoids and forbs on undisturbed sites (Table 86).

Table 86. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Scirpus pungens* (sharp bulrush) habitat type (number = 18 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Eleocharis acicularis (needle spike-rush)	1	0-1	17
Hordeum jubatum (foxtail barley)	1	0-1	17
Juncus torreyi (Torrey's rush)	1	0-1	17
Phalaris arundinacea (reed canarygrass)	3	0-3	17
Phragmites australis (common reed)	1	0-1	17
Scirpus maritimus (alkali bulrush)	1	0-1	17
Scirpus pungens (sharp bulrush)	90	70-98	100
Scirpus validus (softstem bulrush)	1	0-1	17
Forbs			
Cirsium arvense (Canada thistle)	1	0-1	17
Rumex crispus (curly dock)	1	0-1	33
Rumex salicifolius (willow dock)	1	0-1	17
Solidago missouriensis (Missouri goldenrod)	3	0-3	17
Typha latifolia (common cattail)	3	0-3	17
Xanthium strumarium (common cockleburr)	3	0-3	17

SUCCESSIONAL INFORMATION

Scirpus pungens (sharp bulrush) occupies some of the wettest sites on the landscape and tolerates prolonged flooding better than most riparian species. These highly saturated conditions, coupled with an extremely dense rhizomatous root growth, allow this aggressive species to colonize sites at an early successional stage and maintain dominance on undisturbed sites as the climax vegetation. *Typha latifolia* (common cattail) and *Scirpus acutus* (hardstem bulrush) may border this habitat type, acting as competitors; however, the complex interactions between these species and their individual site requirements are not well understood and, as yet, are unable to fully explain vegetation patterns observed on the landscape.

Disturbance can dramatically increase the amount of increaser and invader species such as *Hordeum jubatum* (foxtail barley) and *Juncus balticus* (Baltic rush) (Table 87).

Table 87. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Scirpus pungens* (sharp bulrush) habitat type (number = 11 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Trees			
Salix amygdaloides (peach-leaf willow)	1	0-1	10
Shrubs			
Cornus stolonifera (red-osier dogwood)	1	0-1	10
Prunus virginiana (common chokecherry)	1	0-1	10
Rosa woodsii (woods rose)	1	0-1	10
Salix exigua (sandbar willow)	3	0-3	10
Symphoricarpos occidentalis (western snowberry)	4	0-10	30
Graminoids			
Agropyron species (wheatgrass)	20	0-20	10

Table 87 (cont.)

Species	% Can. Cov. Avg.	Rng.	Con.
Agrostis species (bentgrass)	20	0-20	10
Agropyron repens (quackgrass)	40	0-40	10
Agropyron smithii (western wheatgrass)	4	0-10	40
Calamagrostis stricta (narrow-spiked reedgrass)	3	0-3	10
Carex aquatilis (water sedge)	3	0-3	10
Carex nebrascensis (Nebraska sedge)	3	0-3	10
Carex rostrata (beaked sedge)	3	0-3	10
Eleocharis palustris (common spikesedge)	5	0-10	30
Hordeum jubatum (foxtail barley)	10	0-60	70
Juncus balticus (Baltic rush)	20	0-30	40
Juncus nodosus (tuberous rush)	98	0-98	10
Poa pratensis (Kentucky bluegrass)	20	0-20	10
Polypogon monspeliensis (rabbitfoot polypogon)	1	0-1	10
Scirpus americanus (American bulrush)	70	0-70	10
Scirpus maritimus (alkali bulrush)	2	0-3	20
Scirpus pungens (sharp bulrush)	63	0-90	90
Spartina pectinata (prairie cordgrass)	12	0-20	20
Forbs			
Aster falcatus (white-prairie aster)	20	0-20	10
Chenopodium species (goosefoot)	1	0-1	10
Cirsium arvense (Canada thistle)	1	0-1	10
Epilobium ciliatum (common willow-herb)	20	0-20	10
Glycyrrhiza lepidota (American licorice)	5	0-10	30
Grindelia squarrosa (curlycup gumweed)	3	0-3	10
Melilotus officinalis (yellow sweet-clover)	3	0-3	10
Mentha arvensis (field mint)	12	0-20	20
Ranunculus species (buttercup)	1	0-1	10
Rumex crispus (curly dock)	2	0-3	20
Sonchus asper (prickly sowthistle)	1	0-1	10
Triglochin maritimum (seaside arrow-grass)	10	0-10	10
Xanthium strumarium (common cockleburr)	12	0-30	30

SOILS

Soils are typically classified as Entisols (Fluvaquents) or Mollisols (Haplaquolls) (Hansen and others (1995). Soil textures range from clay loams to loamy sands, and previous years stalks may form a shallow litter layer up to 5 cm (2 in) on some sites. Gleyed and mottled soil features are frequently present in the upper soil horizons, suggesting seasonal flooding or prolonged saturation. Water tables are high, remaining within 1 m (39 in) of the soil surface throughout the year. Soils are rated as somewhat poorly drained to poorly drained. Soil reaction is typically alkali (pH 8.5), and saline soils are common.

ADJACENT COMMUNITIES

Typha latifolia (common cattail) and *Scirpus acutus* (hardstem bulrush) habitat types occupy adjacent deep-water sites, while *Eleocharis palustris* (common spike sedge), *Juncus balticus* (Baltic rush), and sedges inhabits moderately shallow or merely saturated zones. Adjacent drier sites above the waterline may be dominated by *Elaeagnus angustifolia* (Russian olive), *Populus trichocarpa* (black cottonwood), or willows. Mixed grasslands and *Artemisia tridentata* (big sagebrush) scrubland populate hillsides and drier uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is high to very high. However, palatability is low to moderate. *Scirpus pungens* (sharp bulrush) is seldom grazed by livestock or wildlife, provided additional forage is available or the site is in fairly deep water. However, if water levels drop or upland forage is limited, livestock may heavily utilize these communities (Hansen and others 1995).

Wildlife

The *Scirpus pungens* (sharp bulrush) habitat type is an important source of shade, hiding cover, and food for wildlife. *Scirpus pungens* (sharp bulrush) is used by muskrats for construction of huts. Waterfowl use this site type for nesting and hiding cover. Other birds such as red-winged blackbirds and yellow-headed blackbirds are common inhabitants. Deer also use this site type for hiding cover (Hansen and others 1995).

Fisheries

The *Scirpus pungens* (sharp bulrush) habitat type buffers wind and wave action on bodies of water. Warm water fish may make use of this site type as spawning beds. Along streams, this site type helps to filter out sediments and build streambanks (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities

The *Scirpus pungens* (sharp bulrush) habitat type helps filter sediments to build streambanks. This type is fairly drought tolerant being able to persist through several years of dry conditions. *Scirpus pungens* (sharp bulrush) is a prolific seed producer. Dissemination occurs by both wind and water. Seeds require moist, bare soil for germination. Rhizomes spread into exposed areas, rapidly colonizing mudflats and drawdown areas (Hansen and others 1995).

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = semipermanently flooded.

OTHER STUDIES

Lesica and Shelly (1988) described a similar community for the Blackfeet Indian Reservation. Similar sites in the prairie pothole region of the northern Great Plains have been described by Van der Valk (1989) and for the state of Montana by Hansen and others (1995).

Typha latifolia Habitat Type
(Common Cattail Habitat Type)

TYPLAT (TYLA)
Number of Stands Sampled = 18

NOTE: The *Typha latifolia* (common cattail) habitat type includes all combinations of *Typha latifolia* (common cattail) and *Typha angustifolia* (narrow-leaved cattail) due to similarities in environmental conditions and management concerns.

LOCATION AND ASSOCIATED LANDFORMS

The *Typha latifolia* (common cattail) habitat type establishes as a fringe along the margins of ponds and reservoirs, as broad stands in marshes and sloughs, and in narrow bands along oxbows and adjacent to stream and river corridors. This major type, ranging in elevation from 909 to 1,750 m (3,000 to 5,775 ft), occurs on wide, low gradient valleys across southern and eastern Idaho. Often inhabiting relatively deep water and representing one of the wettest riparian types in Idaho, it occupies locations characterized by a permanently flooded to semipermanently flooded water regime.

VEGETATION

Species diversity for stands within the *Typha latifolia* (common cattail) habitat type is generally low. An extensive rhizomatous root system, dense foliage obtaining heights of 2 m (6.5 ft) or more, thick mats of annually accumulating litter, and highly saturated site conditions result in a monoculture, dominated by *Typha latifolia* (common cattail) and/or *Typha angustifolia* (narrow-leaved cattail), on most sites. Affiliated herbaceous species are characteristically sparse and exhibit poor health (Table 88).

Table 88. Average canopy cover, range of canopy cover, and constancy for species recorded in late seral to climax stands of the *Typha latifolia* (common cattail) habitat type (number =12 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Shrubs			
Salix lasiandra (Pacific willow)	1	0-1	8
Solanum dulcamara (climbing nightshade)	2	0-3	17
Graminoids			
Agrostis stolonifera (redtop)	1	0-1	17
Carex nebrascensis (Nebraska sedge)	1	0-1	8
Carex vesicaria (inflated sedge)	1	0-1	17
Eleocharis palustris (common spikesedge)	11	0-20	17
Juncus balticus (Baltic rush)	1	0-1	8
Phalaris arundinacea (reed canarygrass)	2	0-3	17
Scirpus acutus (hardstem bulrush)	3	0-3	8
Scirpus microcarpus (small-flowered bulrush)	3	0-3	8
Forbs			
Alisma triviale (American waterplantain)	1	0-1	8
Berula erecta (cut-leaved water-parsnip)	3	0-3	8
Bidens cernua (nodding beggar-ticks)	20	0-20	8
Chenopodium rubrum (red goosefoot)	1	0-1	8
Epilobium ciliatum (common willow-herb)	3	0-3	8
Forb	1	0-1	8
Galium trifidum (small bedstraw)	1	0-1	8
Lemna minor (water lentil)	20	0-20	8
Mentha arvensis (field mint)	1	0-1	8
Myosotis scorpioides (common forget-me-not)	50	0-50	8
Nasturtium officinale (water-cress)	3	0-3	8
Polygonum amphibium (water smartweed)	1	0-1	8
Polygonum punctatum (water smartweed)	1	0-1	8
Rumex crispus (curly dock)	1	0-1	8
Sagittaria cuneata (arumleaf arrowhead)	10	0-10	8
Sium suave (hemlock water-parsnip)	1	0-1	8
Taraxacum officinale (common dandelion)	1	0-1	8
Typha angustifolia (lesser cattail)	98	0-98	8
Typha latifolia (common cattail)	91	0-98	92
Urtica dioica (stinging nettle)	1	0-1	8

Table 88 (cont.)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Veronica americana (American speedwell)	3	0-3	8

SUCCESSIONAL INFORMATION

Typha latifolia (common cattail) and *Typha angustifolia* (narrow-leaved cattail) are early colonizers of saturated and inundated sites. They are well adapted to prolonged submergence of their roots and lower stems, but require some period of bare soil exposure for germination and establishment. Because seed production is extremely high, they are capable of rapid colonization of wet mineral soils. Due to the saturated soils with water levels either above or near the soil surface throughout the growing season, sites are minimally impacted. However, heavy livestock use can convert stands of this type to the *Carex nebrascensis* (Nebraska sedge) community type (Hansen and others 1995).

Scirpus acutus (hardstem bulrush) and *Carex rostrata* (beaked sedge) compete for similar locations on some sites. These habitat types could actually replace cattail communities where changing environmental conditions favor their particular growth strategies. Nevertheless, when conditions favor cattails, it becomes the dominant community.

Table 89. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Typha latifolia* (common cattail) habitat type (number =6 stands)

Species	% Can. Cov. Avg.	% Can. Cov. Rng.	Con.
Shrubs			
Salix candida (hoary willow)	3	0-3	17
Graminoids			
Calamagrostis stricta (narrow-spiked reedgrass)	1	0-1	17
Carex cusickii (Cusick's sedge)	1	0-1	17
Carex species (sedges)	1	0-1	17
Carex lanuginosa (woolly sedge)	1	0-1	17
Carex rostrata (beaked sedge)	1	0-1	17
Eleocharis palustris (common spikesedge)	1	0-1	17
Juncus balticus (Baltic rush)	20	0-20	17
Scirpus acutus (hardstem bulrush)	40	0-40	17
Forbs			
Epilobium ciliatum (common willow-herb)	1	0-1	17
Floerkea proserpinacoides (false-mermaid)	10	0-10	17
Galium trifidum (small bedstraw)	1	0-1	17
Geum macrophyllum (larged-leaved avens)	3	0-3	17
Hippuris vulgaris (common mare's-tail)	1	0-1	17
Mentha arvensis (field mint)	20	0-20	17
Menyanthes trifoliata (buckbean)	20	0-20	17
Myosotis laxa (small-flowered forget-me-not)	1	0-1	17
Myriophyllum spicatum (spiked water-milfoil)	1	0-1	17
Potamogeton species (pondweed)	20	0-20	17
Potentilla palustris (purple cinquefoil)	20	0-20	17
Ranunculus flammula (creeping buttercup)	1	0-1	17
Sparganium angustifolium (narrowleaf bur-reed)	20	0-20	17
Spirodela polyrhiza (great duckweed)	1	0-1	17
Triglochin maritimum (seaside arrow-grass)	1	0-1	17
Typha latifolia (common cattail)	57	30-90	100
Utricularia species (bladderwort)	3	0-3	17

SOILS

Hansen and others (1995) note that soils are commonly Entisols (Typic Fluvaquents) or Mollisols (Aquolls). Thick accumulations of organic matter, up to 15 cm (6 in) deep, overlay deposits of fine silts and clays that may reach depths of 1 m (39 in) or more. Sands, gravels, and cobbles generally dominate subsurface layers. Stands of this type are commonly inundated with 30-100 cm (12-39 in) of water throughout the year. Redoximorphic features (mottled or gleyed soils) in mineral horizons are common resulting from permanently saturated, anaerobic soil conditions.

ADJACENT COMMUNITIES

Scirpus acutus (hardstem bulrush) may codominant some sites with similar water regimes, although it appears to tolerate more brackish conditions than *Typha latifolia* (common cattail) (Hansen and others 1995). The *Carex rostrata* (beaked sedge) and *Phragmites australis* (common reed) habitat types frequently occupy adjacent, although moderately drier sites. *Phalaris arundinacea* (reed canarygrass), *Eleocharis palustris* (common spikesedge), and *Polygonum* species (smartweed) may persist along the periphery of *Typha latifolia* (common cattail) stands in some areas. Upper floodplains are dominated by *Populus trichocarpa* (black cottonwood) and willows. Hay meadows and pastureland are present on upland plateaus while *Artemisia tridentata* (big sagebrush) grasslands often populate drier hillsides.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock
Typha latifolia (common cattail) is normally little used by livestock. However, if water levels drop or upland forage limiting, livestock may heavily utilize this type. *Typha latifolia* (common cattail) is a highly preferred food of muskrats (Allen and Hoffman 1984).

Wildlife
Typha latifolia (common cattail) is an important source of shade, hiding cover, and food for wildlife. It is used by muskrats for construction of huts. Waterfowl use this type for nesting and hiding cover, provided the stands are not too dense. Dense stands of *Typha latifolia* (common cattail) will hinder waterfowl uses. Deer also use this type for forage and hiding cover. This type is a critical source of nesting and roosting cover for yellow-headed and redwinged blackbirds and wrens (Hansen and others 1995).

Fire
Dense stands of *Typha latifolia* (common cattail) can be burned in late fall or early spring in order to improve habitat for waterfowl (Hansen and others 1995).

Soil Management and Rehabilitation Opportunities
Standing water and continually wet conditions restrict most development on these sites.

Nursery grown containerized plants will have the greatest survival rates and growth rates.

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)
System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = permanently flooded to semipermanently flooded.

OTHER STUDIES

Pierce and Johnson (1986) and Chadde and others (1988) described similar *Typha latifolia* (common cattail) communities. A similar community was described by Padgett and others (1989) for Utah and southeastern Idaho, and Hansen and others (1995) for Montana.

Xanthium strumarium Community Type
(Common Cocklebur Community Type)

XANSTR (XAST)
Number of Stands Sampled = 3

LOCATION AND ASSOCIATED LANDFORMS

The *Xanthium strumarium* (common cocklebur) community type is an incidental type at low to mid elevations in broad, riverine valleys of southcentral and southeastern Idaho. Sampled sites range from 1,181 to 1,575 m (3,900 to 5,200 ft). This community type occupies moist or saturated drawdown zones along the edges of reservoirs and ponds, and active floodplains of stream and riverine systems.

VEGETATION

Xanthium strumarium (common cocklebur) is an aggressive annual that invades exposed mud flats between high and low water marks in riparian corridors and within drawdown zones of lentic systems. It rapidly colonizes damp or moist, bare soils in the early summer, developing a dense, herbaceous layer to a height of 60 cm (24 in), Sites appear to be inundated through the spring, and surface water does not to recede until early summer, when most annual vegetation has already germinated. The formation of the dense herbaceous layer, combined with the lateness of the growing season, results in essentially monotypic stands on most sites. Other disturbance species that take advantage of these conditions include *Chenopodium album* (lambsquarter), *Polygonum hydropiperoides* (waterpepper), and *Rumex crispus* (curly dock) (Table 90).

Table 90. Average canopy cover, range of canopy cover, and constancy for species recorded in disturbed and/or early to mid-seral stands of the *Xanthium strumarium* (common cocklebur) (number = 3 stands)

	% Can. Cov.		
Species	Avg.	Rng.	Con.
Graminoids			
Panicum capillare (common witchgrass)	10	0-10	33
Forbs			
Amaranthus albus (tumbleweed)	10	0-10	33
Chenopodium album (lambsquarter)	6	0-10	67
Polygonum hydropiperoides (waterpepper)	6	0-10	67
Rumex crispus (curly dock)	1	0-1	67
Solidago missouriensis (Missouri goldenrod)	3	0-3	33
Xanthium strumarium (common cocklebur)	93	90-98	100

SUCCESSIONAL INFORMATION

Sites occupied by the *Xanthium strumarium* (common cocklebur) community type are characterized by extreme fluctuations in water tables. Most wetland communities are unable to persist under such extreme conditions. Trends that stabilize seasonal variations encourage occupation by other types. In general, impoundments shift physical conditions to favor wetter types such as *Typha latifolia* (common cattail) or *Scirpus acutus* (hardstem bulrush) in deep water, and *Eleocharis palustris* (common spikesedge) or sedges on shallower, saturated sites. Desiccation may result in shifts toward drier graminoid communities like the *Agrostis stolonifera* (redtop), *Bromus inermis* (smooth brome), or *Poa pratensis* (Kentucky bluegrass) community types. Physical site parameters and neighboring communities should aid in the identification of the potential climax community for most sites.

SOILS

The *Xanthium strumarium* (common cocklebur) community type establishes on a variety of soil textures ranging from fine clays to sandy loams (Hansen and others 1988). Nutrient rich, black mucky organic layers are present at some locations. Soils types should classify to Mollisols, or possibly Histosols or Entisols. *Xanthium strumarium* (common cocklebur) is considered tolerant of saline or alkaline conditions, and flooding (Hansen and others 1995). Mottled and gleyed and soil features may occur on some sites due to prolonged seasonal inundation during various times of the year.

ADJACENT COMMUNITIES

Typha latifolia (common cattail) and *Scirpus acutus* (hardstem bulrush) habitat types occupy adjacent deep-water sites, while *Eleocharis palustris* (common spike sedge), *Juncus balticus* (Baltic rush), and sedges inhabits moderately shallow or merely saturated zones. Adjacent drier sites above the waterline may be dominated by *Elaeagnus angustifolia* (Russian olive), *Populus trichocarpa* (black cottonwood), or willows. Mixed grasslands and *Artemisia tridentata* (big sagebrush) scrubland vegetate hillsides and drier uplands.

MANAGEMENT INFORMATION

Additional management information can be found in Appendix A.

Livestock

Herbage production is rated low for this community type. Seedlings and fruits of *Xanthium strumarium* (common cocklebur) are poisonous to cattle, sheep, and young hogs (Hansen and others 1988). This community type should be avoided early in the season.

Wildlife

Xanthium strumarium (common cocklebur) is of low palatability to wild ungulates (Hansen and others 1988), although it may provide habitat and shelter for smaller animals and birds.

Soil Management and Rehabilitation Opportunities

Shore vegetation around reservoirs is a mosaic of short-lived plant communities that may survive from one to many years before being eliminated by a combination of high water or grazing. These shore communities are composed primarily of early successional species that become established during either the fall or spring when water levels are low. Repeated annual drawdowns perpetuate this disturbance and associated vegetation. Shore vegetation is important in providing habitat for terrestrial wildlife, certain fish species, and livestock. These communities also protect shores from accelerated erosion, and enhance the aesthetic quality of the shore environment (Hansen and others 1988).

RELATIONSHIP TO OTHER CLASSIFICATION SYSTEMS

One additional classification system that is being used to describe/define riparian and wetland ecosystems is listed below along with the appropriate "type(s)" that best describes this particular habitat type or community type.

USDI Fish and Wildlife Service Wetland Classification (Cowardin and others 1979)

System = palustrine; Class = emergent wetland; Subclass = persistent; Water Regime (nontidal) = seasonally flooded.

OTHER STUDIES

Hansen and others (1988) describe a *Xanthium strumarium* (common cocklebur) dominance type for the state of Montana.

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APPENDIX A. MANAGEMENT INFORMATION FOR SELECTIVE PLANT SPECIES IN THE PROJECT AREA

Appendix A contain the following management information on a species-by-species basis: 1) forage palatability for cattle, sheep, and horses, 2) wetland status, 3) energy value, 4) protein value, 5) thermal or feeding cover values for elk, mule deer, whitetail deer, upland game birds, waterfowl, small non-game birds, and small mammal), 6) food value or degree of use for elk, mule deer, whitetail deer, antelope, upland game birds, waterfowl, small non-game birds, and small mammals, 7) potential biomass production, 8) erosion control potential, 9) short-term revegetation potential, and 10) long-term revegetation potential.

The management information is from the document *The Plant Information Network (PIN) Data Base: Colorado, Montana, North Dakota, Utah, and Wyoming* by Dittberner and Olson (1983), with some modifications (Hansen and others 1995). In some instances, no management information was available for certain plant species. The authors then used professional experience along with information that was available for species with similar morphological or physiological characteristics.

APPENDIX A-1. Forage palatability for cattle, sheep, and horses

Palatability refers to the relish and degree of use shown by livestock for a plant or plant part. **G** (Good) = highly relished and consumed to a high degree; **F** (Fair) = moderately relished and consumed to a moderate degree; **P** (Poor) = not relished and normally consumed to only a small degree or not at all.

Species	Cattle Forage Palatability	Sheep Forage Palatability	Horse Forage Palatability
Trees			
Abies lasiocarpa (subalpine fir)	P	P	P
Acer negundo (box-elder)	P	P	P
Elaeagnus angustifolia (Russian olive)	P	P	P
Fraxinus pennsylvanica (green ash)	F	F	F
Juniperus scopulorum (Rocky Mountain juniper)	P	P	P
Picea engelmannii (Engelmann spruce)	P	P	P
Picea glauca (white spruce)	P	P	P
Pinus contorta (lodgepole pine)	P	P	P
Pinus ponderosa (ponderosa pine)	P	P	P
Populus angustifolia (narrowleaf cottonwood)	P	F	P
Populus deltoides (Great Plains cottonwood)	P	F	P
Populus tremuloides (quaking aspen)	F	G	F
Populus trichocarpa (black cottonwood)	P	F	P
Pseudotsuga menziesii (Douglas fir)	P	P	P
Salix amygdaloides (peach-leaf willow)	F	G	F
Shrubs			
Acer glabrum (Rocky Mountain maple)	P	F	P
Alnus incana (mountain alder)	P	F	P
Amelanchier alnifolia (western serviceberry)	F	G	F
Arctostaphylos uva-ursi (kinnikinnick)	P	P	P
Artemisia cana (silver sagebrush)	F	G	F
Betula glandulosa (bog birch)	P	F	P
Betula occidentalis (water birch)	P	P	P
Clematis ligusticifolia (western virgins-bower)	P	F	P
Cornus stolonifera (red-osier dogwood)	F	F	P
Crataegus douglasii (black hawthorn)	F	F	P
Crataegus succulenta (succulent hawthorn)	F	F	P
Elaeagnus commutata (silverberry)	P	F	P
Kalmia microphylla (small-leaved laurel)	P	P	P
Lonicera utahensis (Utah honeysuckle)	F	F	P
Potentilla fruticosa (shrubby cinquefoil)	P	F	P
Prunus americana (wild plum)	F	F	P

APPENDIX A-1. (cont.)

Species	Cattle Forage Palatability	Sheep Forage Palatability	Horse Forage Palatability
Prunus virginiana (common chokecherry)	F	G	P
Rhus aromatica (fragrant sumac)	P	F	P
Ribes odoratum (buffalo currant)	F	F	P
Ribes setosum (Missouri gooseberry)	P	P	P
Rosa acicularis (prickly rose)	F	F	P
Rosa woodsii (woods rose)	F	F	P
Rubus parviflorus (thimbleberry)	P	F	P
Salix bebbiana (Bebb willow)	G	G	G
Salix boothii (Booth willow)	F	F	F
Salix drummondiana (Drummond willow)	P	F	F
Salix exigua (sandbar willow)	F	F	F
Salix geyeriana (Geyer willow)	F	G	G
Salix lasiandra (Pacific willow)	F	F	F
Salix lutea (yellow willow)	F	G	G
Sarcobatus vermiculatus (black greasewood)	F	F	F
Shepherdia argentea (thorny buffaloberry)	P	F	P
Shepherdia canadensis (Canada buffaloberry)	P	F	P
Spiraea betulifolia (shiny-leaf spiraea)	P	F	P
Symphoricarpos albus (common snowberry)	F	F	P
Symphoricarpos occidentalis (western snowberry)	F	F	P
Vaccinium cespitosum (dwarf huckleberry)	P	F	P
Vaccinium scoparium (whortleberry)	P	F	P
Graminoids			
Agropyron caninum (bearded wheatgrass)	G	G	G
Agropyron repens (quackgrass)	G	F	G
Agropyron smithii (western wheatgrass)	G	G	G
Agrostis stolonifera (redtop)	F	F	F
Beckmannia syzigachne (American sloughgrass)	G	F	G
Bromus anomalus (nodding brome)	G	F	G
Bromus ciliatus (fringed brome)	G	G	G
Bromus inermis (smooth brome)	G	G	G
Calamagrostis canadensis (bluejoint reedgrass)	G	F	G
Calamagrostis rubescens (pinegrass)	F	P	F
Calamagrostis stricta (narrow-spiked reedgrass)	G	F	G
Carex aquatilis (water sedge)	G	G	G
Carex atherodes (awned sedge)	G	F	G
Carex lanuginosa (woolly sedge)	G	G	F
Carex lasiocarpa (slender sedge)	P	P	P
Carex microptera (small-winged sedge)	F	P	F
Carex nebrascensis (Nebraska sedge)	G	F	G
Carex nigricans (black alpine sedge)	F	F	F
Carex rostrata (beaked sedge)	F	F	G
Carex scopulorum (Holm's Rocky Mountain sedge)	F	F	F
Carex simulata (short-beaked sedge)	P	P	P
Carex vesicaria (inflated sedge)	F	F	F
Deschampsia cespitosa (tufted hairgrass)	G	F	G
Distichlis spicata (inland saltgrass)	F	F	G
Eleocharis acicularis (needle spike-rush)	F	F	F
Eleocharis palustris (common spikesedge)	P	P	P
Eleocharis pauciflora (few-flowered spike-rush)	P	P	P
Elymus canadensis (Canada wildrye)	F	F	G
Elymus cinereus (basin wildrye)	G	F	G

APPENDIX A-1. (cont.)

Species	Cattle Forage Palatability	Sheep Forage Palatability	Horse Forage Palatability
Elymus glaucus (blue wildrye)	G	F	G
Festuca idahoensis (Idaho fescue)	G	G	G
Glyceria borealis (northern mannagrass)	G	G	G
Glyceria grandis (American mannagrass)	G	G	G
Glyceria striata (fowl mannagrass)	G	G	G
Hordeum jubatum (foxtail barley)	P	F	F
Juncus balticus (Baltic rush)	F	P	F
Phalaris arundinacea (reed canarygrass)	G	G	G
Phleum alpinum (alpine timothy)	G	G	G
Phleum pratense (common timothy)	G	G	G
Phragmites australis (common reed)	F	P	F
Poa palustris (fowl bluegrass)	F	F	F
Poa pratensis (Kentucky bluegrass)	G	G	G
Puccinellia nuttalliana (Nuttall alkaligrass)	F	F	F
Scirpus acutus (hardstem bulrush)	F	P	F
Scirpus maritimus (alkali bulrush)	F	F	F
Scirpus pungens (sharp bulrush)	F	F	F
Scirpus validus (softstem bulrush)	F	P	P
Spartina gracilis (alkali cordgrass)	F	F	F
Spartina pectinata (prairie cordgrass)	G	F	F
Stipa occidentalis (western needlegrass)	G	F	G
Trisetum spicatum (spike trisetum)	F	F	G
Forbs			
Achillea millefolium (common yarrow)	P	F	P
Actaea rubra (baneberry)	P	F	P
Arnica cordifolia (heart-leaf arnica)	P	F	P
Aster foliaceus (leafy aster)	F	G	G
Cirsium arvense (Canada thistle)	P	P	P
Epilobium angustifolium (fireweed)	F	G	F
Equisetum arvense (field horsetail)	P	P	P
Equisetum fluviatile (water horsetail)	P	P	P
Equisetum laevigatum (smooth scouring-rush)	P	P	P
Fragaria virginiana (Virginia strawberry)	P	G	P
Galium boreale (northern bedstraw)	P	F	P
Geranium richardsonii (white geranium)	F	G	F
Geranium viscosissimum (sticky geranium)	F	G	F
Geum triflorum (old man's whiskers)	P	F	P
Glycyrrhiza lepidota (American licorice)	P	F	P
Heracleum lanatum (cow-parsnip)	G	G	G
Melilotus alba (white sweetclover)	G	G	G
Melilotus officinalis (yellow sweet-clover)	G	G	G
Mertensia ciliata (mountain bluebell)	F	G	F
Osmorhiza chilensis (mountain sweet-cicely)	F	F	F
Pedicularis groenlandica (elephant's head)	P	F	P
Polygonum amphibium (water smartweed)	F	F	F
Polygonum bistortoides (American bistort)	P	F	P
Polygonum lapathifolium (willow weed)	P	P	P
Potentilla anserina (common silverweed)	F	F	P
Potentilla gracilis (slender cinquefoil)	P	F	P
Senecio triangularis (arrowleaf groundsel)	F	G	F
Smilacina stellata (starry Solomon-plume)	P	F	P
Solidago canadensis (Canada goldenrod)	P	P	P

APPENDIX A-1. (cont.)

Species	Cattle Forage Palatability	Sheep Forage Palatability	Horse Forage Palatability
Taraxacum officinale (common dandelion)	F	G	G
Thalictrum occidentale (western meadowrue)	P	F	P
Trifolium repens (white clover)	G	G	G
Triglochin maritimum (seaside arrow-grass)	P	P	P
Typha angustifolia (hybrid cattail)	P	P	P
Typha latifolia (common cattail)	P	P	P
Urtica dioica (stinging nettle)	P	F	P
Viola adunca (hook violet)	F	G	P

APPENDIX A-2. Wetland status, energy value, and protein value

Wetland status refers to plant species that have exhibited and ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows: **OBL** (Obligate Wetland) refers to species that almost always occur (estimated probability greater than 99%) under natural conditions in wetlands; **FACW** (Facultative Wetland) refers to species that usually occur in wetlands (estimated probability 67-99%), but is occasionally found in non-wetlands; **FAC** (Facultative) refers to species that are equally likely to occur in wetlands or non-wetlands (estimated probability 34-66%); **FACU** (Facultative Upland) refers to species that usually occur in non-wetlands (estimated probability 67-99%), but is occasionally found in wetlands (estimated probability 1-33%). The category for the species listed above where obtained from Reed (1988a, 1988b); however, for some species no information was available. In those instances, the authors used professional experience using information available for species with similar morphological or physiological characteristics.

Energy value refers to the usable energy a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a ***comparable life form*** (e.g., a grass is compared to other grasses). **H** (High) = retains usable energy value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains usable energy value moderately well during fall and winter; **L** (Low) = poor retention of usable energy value during fall and winter (e.g., cures poorly and/or drops leaves).

Protein value refers to the digestible protein a plant provides to livestock or wildlife during the period from flowering or early seed formation to the following spring, within a comparable life form (e.g., a grass is compared to other grasses). **H** (High) = retains digestible protein value well during fall and winter (e.g., cures well and/or retains leaves); **M** (Medium) = retains digestible protein value moderately well during fall and winter; **L** (Low) = poor retention of digestible protein value during fall and winter (e.g., cures poorly and/or drops leaves).

Species	Wetland Status	Energy Value	Protein Value
Trees			
Abies lasiocarpa (subalpine fir)	FACU	M	L
Acer negundo (box-elder)	FACW	M	L
Elaeagnus angustifolia (Russian olive)	FACW	M	M
Fraxinus pennsylvanica (green ash)	FACW	M	L
Juniperus scopulorum (Rocky Mountain juniper)	FACU	H	M
Picea engelmannii (Engelmann spruce)	FAC	M	L
Picea glauca (white spruce)	FAC	M	L
Pinus contorta (lodgepole pine)	FAC	M	L
Pinus ponderosa (ponderosa pine)	FACU	M	L
Populus angustifolia (narrowleaf cottonwood)	FACW	M	M
Populus deltoides (Great Plains cottonwood)	FACW	M	M

APPENDIX A-2. (cont.)

Species	Wetland Status	Energy Value	Protein Value
Populus tremuloides (quaking aspen)	FAC	M	M
Populus trichocarpa (black cottonwood)	FACW	M	M
Pseudotsuga menziesii (Douglas fir)	FACU	M	M
Salix amygdaloides (peach-leaf willow)	FACW	M	L
Shrubs			
Acer glabrum (Rocky Mountain maple)	FAC	M	L
Alnus incana (mountain alder)	FACW	M	L
Amelanchier alnifolia (western serviceberry)	FACU	M	M
Artemisia cana (silver sagebrush)	FAC	M	M
Berberis repens (creeping Oregongrape)	FAC	M	M
Betula glandulosa (bog birch)	OBL	L	L
Betula occidentalis (water birch)	FACW	M	M
Clematis ligusticifolia (western virgins-bower)	FACU	L	L
Cornus stolonifera (red-osier dogwood)	FACW	M	L
Crataegus douglasii (black hawthorn)	FAC	M	M
Crataegus succulenta (succulent hawthorn)	FAC	M	M
Elaeagnus commutata (silverberry)	FAC	M	M
Kalmia microphylla (small-leaved laurel)	FACW	—	—
Ledum glandulosum (Labrador tea)	FACW	M	M
Lonicera utahensis (Utah honeysuckle)	FACU	L	L
Potentilla fruticosa (shrubby cinquefoil)	FAC	M	L
Prunus americana (wild plum)	FACU	M	M
Prunus virginiana (common chokecherry)	FACU	H	M
Rhus aromatica (fragrant sumac)	FACU	M	L
Ribes lacustre (swamp currant)	FAC	M	L
Ribes odoratum (buffalo currant)	FACU	L	L
Ribes setosum (Missouri gooseberry)	—	L	L
Rosa acicularis (prickly rose)	FACU	L	L
Rosa woodsii (woods rose)	FACU	L	L
Rubus parviflorus (thimbleberry)	FACU	L	L
Salix bebbiana (Bebb willow)	FACW	M	L
Salix boothii (Booth willow)	OBL	M	L
Salix brachycarpa (short-fruited willow)	FACW	M	L
Salix candida (hoary willow)	OBL	M	L
Salix commutata (undergreen willow)	OBL	M	L
Salix drummondiana (Drummond willow)	FACW	M	L
Salix exigua (sandbar willow)	OBL	M	L
Salix geyeriana (Geyer willow)	FACW	M	L
Salix lasiandra (Pacific willow)	FACW	M	L
Salix lutea (yellow willow)	OBL	M	L
Salix planifolia (planeleaf willow)	OBL	M	L
Salix wolfii (Wolf's willow)	FACW	M	L
Sarcobatus vermiculatus (black greasewood)	FACU	M	M
Shepherdia argentea (thorny buffaloberry)	FACU	M	L
Shepherdia canadensis (Canada buffaloberry)	—	M	L
Symphoricarpos albus (common snowberry)	FACU	M	M
Symphoricarpos occidentalis (western snowberry)	FACU	M	M
Vaccinium cespitosum (dwarf huckleberry)	FACU	L	M
Vaccinium scoparium (whortleberry)	FACU	L	M
Graminoids			
Agropyron caninum (bearded wheatgrass)	FAC	H	M
Agropyron repens (quackgrass)	FACU	M	L

APPENDIX A-2. (cont.)

Species	Wetland Status	Energy Value	Protein Value
Agropyron smithii (western wheatgrass)	FACU	H	M
Agrostis stolonifera (redtop)	FACW	M	L
Beckmannia syzigachne (American sloughgrass)	OBL	L	L
Bromus anomalus (nodding brome)	—	M	L
Bromus ciliatus (fringed brome)	FAC	M	L
Bromus inermis (smooth brome)	FAC	M	L
Calamagrostis canadensis (bluejoint reedgrass)	FACW	M	L
Calamagrostis rubescens (pinegrass)	—	M	L
Calamagrostis stricta (narrow-spiked reedgrass)	FACW	M	L
Carex aquatilis (water sedge)	OBL	M	M
Carex atherodes (awned sedge)	OBL	M	L
Carex buxbaumii (Buxbaum's sedge)	OBL	M	M
Carex lanuginosa (woolly sedge)	OBL	M	L
Carex lasiocarpa (slender sedge)	OBL	M	M
Carex lenticularis (lentil-fruit sedge)	FACW	M	M
Carex limosa (mud sedge)	OBL	M	M
Carex microptera (small-winged sedge)	FAC	M	M
Carex nebrascensis (Nebraska sedge)	OBL	H	M
Carex nigricans (black alpine sedge)	FACW	M	M
Carex rostrata (beaked sedge)	OBL	M	L
Carex scopulorum (Holm's Rocky Mountain sedge)	FACW	M	M
Carex simulata (short-beaked sedge)	OBL	M	M
Carex vesicaria (inflated sedge)	OBL	M	L
Deschampsia cespitosa (tufted hairgrass)	FACW	M	L
Distichlis spicata (inland saltgrass)	FACW	M	L
Eleocharis acicularis (needle spike-rush)	OBL	M	L
Eleocharis palustris (common spikesedge)	OBL	M	L
Eleocharis pauciflora (few-flowered spike-rush)	OBL	M	L
Elymus canadensis (Canada wildrye)	FAC	H	L
Elymus cinereus (basin wildrye)	FACU	H	L
Elymus glaucus (blue wildrye)	FACU	H	L
Festuca idahoensis (Idaho fescue)	—	H	M
Glyceria borealis (northern mannagrass)	OBL	M	L
Glyceria grandis (American mannagrass)	FACW	M	L
Glyceria striata (fowl mannagrass)	OBL	M	L
Hordeum jubatum (foxtail barley)	FAC	M	L
Juncus balticus (Baltic rush)	OBL	M	L
Phalaris arundinacea (reed canarygrass)	FACW	M	L
Phleum alpinum (alpine timothy)	FAC	H	L
Phleum pratense (common timothy)	FACU	M	L
Phragmites australis (common reed)	FACW	M	L
Poa palustris (fowl bluegrass)	FAC	M	L
Poa pratensis (Kentucky bluegrass)	FACU	M	L
Puccinellia nuttalliana (Nuttall alkaligrass)	OBL	M	L
Scirpus acutus (hardstem bulrush)	OBL	M	L
Scirpus maritimus (alkali bulrush)	OBL	M	L
Scirpus pungens (sharp bulrush)	OBL	M	L
Scirpus validus (softstem bulrush)	OBL	L	L
Spartina gracilis (alkali cordgrass)	FACW	M	L
Spartina pectinata (prairie cordgrass)	OBL	M	L
Trisetum spicatum (spike trisetum)	FACU	M	L
Forbs			
Achillea millefolium (common yarrow)	FACU	L	L

Species	Wetland Status	Energy Value	Protein Value
Actaea rubra (baneberry)	—	L	L
Aralia nudicaulis (wild sarsaparilla)	FACU	L	L
Arnica cordifolia (heart-leaf arnica)	—	L	L
Aster conspicuus (showy aster)	—	L	L
Aster foliaceus (leafy aster)	FACW	L	L
Caltha leptosepala (elkslip marshmarigold)	OBL	L	L
Cirsium arvense (Canada thistle)	FACU	L	L
Cirsium scariosum (elk thistle)	—	L	L
Clintonia uniflora (queen's cup)	FAC	L	L
Epilobium angustifolium (fireweed)	FACU	L	L
Epilobium ciliatum (common willow-herb)	FACW	L	L
Equisetum arvense (field horsetail)	FAC	L	L
Equisetum fluviatile (water horsetail)	OBL	L	L
Equisetum laevigatum (smooth scouring-rush)	FACW	L	L
Fragaria virginiana (Virginia strawberry)	—	L	L
Galium boreale (northern bedstraw)	FACU	L	L
Galium trifidum (small bedstraw)	FACW	L	L
Galium triflorum (sweetscented bedstraw)	FACU	L	L
Geranium richardsonii (white geranium)	FACU	L	L
Geranium viscosissimum (sticky geranium)	FAC	L	L
Geum macrophyllum (large-leaved avens)	FACW	L	L
Geum triflorum (old man's whiskers)	FACU	L	L
Glycyrrhiza lepidota (American licorice)	FAC	M	L
Heracleum lanatum (cow-parsnip)	FAC	L	L
Melilotus alba (white sweetclover)	FACU	M	L
Melilotus officinalis (yellow sweet-clover)	FACU	M	L
Mertensia ciliata (mountain bluebell)	FACW	L	L
Osmorhiza occidentalis (western sweet-cicely)	FAC	L	L
Pedicularis groenlandica (elephant's head)	OBL	L	L
Polygonum amphibium (water smartweed)	OBL	L	L
Polygonum bistortoides (American bistort)	FACW	L	L
Polygonum lapathifolium (willow weed)	FACW	L	L
Potentilla anserina (common silverweed)	OBL	L	L
Potentilla diversifolia (diverse-leaved cinquefoil)	FACU	L	L
Potentilla gracilis (slender cinquefoil)	FAC	L	L
Potentilla norvegica (Norwegian cinquefoil)	FAC	L	L
Potentilla palustris (purple cinquefoil)	OBL	L	L
Sagittaria cuneata (arumleaf arrowhead)	OBL	L	L
Senecio hydrophilus (alkali-marsh butterweed)	OBL	L	L
Senecio triangularis (arrowleaf groundsel)	FACW	L	L
Smilacina stellata (starry Solomon-plume)	FAC	L	L
Solidago canadensis (Canada goldenrod)	FACU	L	L
Streptopus amplexifolius (clasping-leaved twisted stalk)	FAC	L	L
Taraxacum officinale (common dandelion)	FACU	L	L
Thalictrum occidentale (western meadowrue)	FACU	L	L
Trifolium repens (white clover)	FACU	L	L
Triglochin maritimum (seaside arrow-grass)	OBL	L	L
Typha angustifolia (hybrid cattail)	OBL	M	L
Typha latifolia (common cattail)	OBL	L	L
Urtica dioica (stinging nettle)	FAC	L	L
Viola adunca (hook violet)	FAC	L	L
Viola canadensis (Canada violet)	FAC	L	L
Viola orbiculata (round-leaved violet)	—	L	L

APPENDIX A-3. Thermal or feeding cover values for elk, mule deer, and whitetail deer

Thermal or feeding cover value refers to the degree to which a plant provides environmental protection (e.g., thermal or feeding cover), during one or more seasons. **G** (Good) = readily utilized for cover when available; **F** (Fair) = moderately utilized for cover when available; **P** (Poor) = rarely or never utilized for cover when available.

Species	Elk Cover Value	Mule Deer Cover Value	Whitetail Deer Cover Value
Trees			
Abies lasiocarpa (subalpine fir)	F	F	F
Acer negundo (box-elder)	P	G	G
Elaeagnus angustifolia (Russian olive)	F	F	G
Fraxinus pennsylvanica (green ash)	F	F	G
Juniperus scopulorum (Rocky Mountain juniper)	G	G	G
Picea engelmannii (Engelmann spruce)	G	G	G
Picea glauca (white spruce)	G	G	G
Pinus contorta (lodgepole pine)	G	G	G
Pinus ponderosa (ponderosa pine)	G	G	G
Populus angustifolia (narrowleaf cottonwood)	F	F	F
Populus deltoides (Great Plains cottonwood)	F	F	G
Populus tremuloides (quaking aspen)	G	G	G
Populus trichocarpa (black cottonwood)	F	F	G
Pseudotsuga menziesii (Douglas fir)	G	G	G
Salix amygdaloides (peach-leaf willow)	F	G	G
Shrubs			
Acer glabrum (Rocky Mountain maple)	F	F	F
Alnus incana (mountain alder)	F	F	F
Amelanchier alnifolia (western serviceberry)	P	F	F
Artemisia cana (silver sagebrush)	P	F	P
Betula glandulosa (bog birch)	P	P	P
Betula occidentalis (water birch)	F	G	G
Cornus stolonifera (red-osier dogwood)	F	F	F
Crataegus douglasii (black hawthorn)	F	G	G
Crataegus succulenta (succulent hawthorn)	F	G	G
Elaeagnus commutata (silverberry)	F	F	F
Kalmia microphylla (small-leaved laurel)	F	F	F
Lonicera utahensis (Utah honeysuckle)	F	F	F
Potentilla fruticosa (shrubby cinquefoil)	P	P	P
Prunus americana (wild plum)	P	F	G
Prunus virginiana (common chokecherry)	F	G	G
Rhus aromatica (fragrant sumac)	F	F	F
Ribes lacustre (swamp currant)	P	F	F
Ribes odoratum (buffalo currant)	F	G	G
Ribes setosum (Missouri gooseberry)	P	F	F
Rosa acicularis (prickly rose)	F	G	G
Rosa woodsii (woods rose)	F	G	G
Salix bebbiana (Bebb willow)	G	G	G
Salix boothii (Booth willow)	G	G	G
Salix drummondiana (Drummond willow)	G	G	G
Salix exigua (sandbar willow)	G	G	G
Salix geyeriana (Geyer willow)	G	G	G
Salix lasiandra (Pacific willow)	G	G	G
Salix lutea (yellow willow)	G	G	G
Salix planifolia (planeleaf willow)	F	F	F
Salix wolfii (Wolf's willow)	F	F	F

APPENDIX A-3. (cont.)

Species	Elk Cover Value	Mule Deer Cover Value	Whitetail Deer Cover Value
Sarcobatus vermiculatus (black greasewood)	P	F	F
Shepherdia argentea (thorny buffaloberry)	G	G	G
Shepherdia canadensis (Canada buffaloberry)	P	F	F
Spiraea betulifolia (shiny-leaf spiraea)	P	P	P
Symphoricarpos albus (common snowberry)	P	F	F
Symphoricarpos occidentalis (western snowberry)	P	F	F
Vaccinium cespitosum (dwarf huckleberry)	P	P	P
Vaccinium scoparium (whortleberry)	P	P	P
Graminoids—in general, provide poor cover except for the following species:			
Phalaris arundinacea (reed canarygrass)	P	G	G
Phragmites australis (common reed)	F	G	G
Scirpus acutus (hardstem bulrush)	P	F	P
Scirpus pungens (sharp bulrush)	P	F	F
Scirpus validus (softstem bulrush)	P	G	G
Spartina gracilis (alkali cordgrass)	P	F	G
Spartina pectinata (prairie cordgrass)	P	F	G
Forbs—in general, provide poor cover except for the following species:			
Melilotus alba (white sweetclover)	P	F	F
Melilotus officinalis (yellow sweet-clover)	P	F	F
Typha angustifolia (hybrid cattail)	P	F	G
Typha latifolia (common cattail)	P	F	G

APPENDIX A-4. Thermal or feeding cover values for upland game birds, waterfowl, small non-game birds, and small mammals

Thermal or feeding cover value refers to the degree to which a plant provides environmental protection (e.g., thermal, nesting, brooding, or feeding cover), during one or more seasons. **G** (Good) = readily utilized for cover when available; **F** (Fair) = moderately utilized for cover when available; **P** (Poor) = rarely or never utilized for cover when available.

Species	Upland Game Bird Cover Value	Waterfowl Cover Value	Small Non-game Bird Cover Value	Small Mammal Cover Value
Trees				
Abies lasiocarpa (subalpine fir)	G	P	F	G
Acer negundo (box-elder)	G	P	G	F
Elaeagnus angustifolia (Russian olive)	G	F.	G	F
Fraxinus pennsylvanica (green ash)	F	F	G	G
Juniperus scopulorum (Rocky Mountain juniper)	F	F	F	F
Picea engelmannii (Engelmann spruce)	G	P	G	G
Picea glauca (white spruce)	G	P	G	G
Pinus contorta (lodgepole pine)	G	P	G	G
Pinus ponderosa (ponderosa pine)	G	P	G	G
Populus angustifolia (narrowleaf cottonwood)	F	F	G	G
Populus deltoides (Great Plains cottonwood)	F	F	F	P
Populus tremuloides (quaking aspen)	G	F	G	G
Populus trichocarpa (black cottonwood)	F	F	G	G

APPENDIX A-4. (cont.)

Species	Upland Game Bird Cover Value	Waterfowl Cover Value	Small Non-game Bird Cover Value	Small Mammal Cover Value
Pseudotsuga menziesii (Douglas fir)	G	P	G	G
Salix amygdaloides (peach-leaf willow)	G	F	G	G
Shrubs				
Acer glabrum (Rocky Mountain maple)	F	F	F	F
Alnus incana (mountain alder)	F	G	F	F
Amelanchier alnifolia (western serviceberry)	F	G	F	F
Artemisia cana (silver sagebrush)	F	G	G	G
Betula glandulosa (bog birch)	F	G	F	F
Betula occidentalis (water birch)	G	G	G	G
Cornus stolonifera (red-osier dogwood)	F	F	F	F
Crataegus douglasii (black hawthorn)	F	F	F	F
Crataegus succulenta (succulent hawthorn)	F	F	F	F
Elaeagnus commutata (silverberry)	F	G	F	F
Kalmia microphylla (small-leaved laurel)	F	P	F	F
Lonicera utahensis (Utah honeysuckle)	F	P	F	F
Potentilla fruticosa (shrubby cinquefoil)	F	P	P	P
Prunus americana (wild plum)	G	G	G	G
Prunus virginiana (common chokecherry)	G	G	G	G
Rhus aromatica (fragrant sumac)	F	G	F	F
Ribes lacustre (swamp currant)	G	G	G	G
Ribes odoratum (buffalo currant)	G	G	G	G
Ribes setosum (Missouri gooseberry)	G	G	G	G
Rosa acicularis (prickly rose)	F	G	F	F
Rosa woodsii (woods rose)	F	G	F	F
Salix bebbiana (Bebb willow)	G	F	G	G
Salix boothii (Booth willow)	G	F	G	G
Salix drummondiana (Drummond willow)	G	F	G	G
Salix exigua (sandbar willow)	G	G	G	G
Salix geyeriana (Geyer willow)	G	F	G	G
Salix lasiandra (Pacific willow)	G	F	G	G
Salix lutea (yellow willow)	G	F	G	G
Salix planifolia (planeleaf willow)	F	F	F	F
Salix wolfii (Wolf's willow)	F	F	F	F
Sarcobatus vermiculatus (black greasewood)	F	G	G	G
Shepherdia argentea (thorny buffaloberry)	G	G	G	F
Shepherdia canadensis (Canada buffaloberry)	G	G	G	F
Spiraea betulifolia (shiny-leaf spiraea)	P	G	P	P
Symphoricarpos albus (common snowberry)	G	G	G	G
Symphoricarpos occidentalis (western snowberry)	G	G	G	G
Vaccinium cespitosum (dwarf huckleberry)	P	G	P	P
Vaccinium scoparium (whortleberry)	P	G	P	P
Graminoids				
Agropyron caninum (bearded wheatgrass)	G	G	F	F
Agropyron repens (quackgrass)	G	G	F	G
Agropyron smithii (western wheatgrass)	G	G	G	G
Agrostis stolonifera (redtop)	G	G	F	F
Bromus inermis (smooth brome)	G	G	G	F
Calamagrostis canadensis (bluejoint reedgrass)	P	G	P	P
Calamagrostis rubescens (pinegrass)	F	G	P	P
Carex aquatilis (water sedge)	P	F	F	F

APPENDIX A-4. (cont.)

Species	Upland Game Bird Cover Value	Waterfowl Cover Value	Small Non-game Bird Cover Value	Small Mammal Cover Value
Carex lanuginosa (woolly sedge)	P	F	F	F
Carex lasiocarpa (slender sedge)	P	F	F	F
Carex lenticularis (lentil-fruit sedge)	P	F	F	F
Carex nebrascensis (Nebraska sedge)	P	F	F	G
Carex rostrata (beaked sedge)	P	P	F	F
Carex vesicaria (inflated sedge)	P	F	F	F
Deschampsia cespitosa (tufted hairgrass)	P	G	P	P
Distichlis spicata (inland saltgrass)	P	P	P	P
Elymus canadensis (Canada wildrye)	F	G	P	P
Elymus cinereus (basin wildrye)	F	G	P	P
Glyceria borealis (northern mannagrass)	F	G	G	G
Glyceria grandis (American mannagrass)	F	G	G	G
Glyceria striata (fowl mannagrass)	F	G	G	G
Hordeum jubatum (foxtail barley)	P	G	P	P
Juncus balticus (Baltic rush)	F	G	F	F
Phalaris arundinacea (reed canarygrass)	F	G	F	F
Phleum alpinum (alpine timothy)	P	F	P	P
Phleum pratense (common timothy)	F	G	F	F
Phragmites australis (common reed)	G	G	G	G
Eleocharis acicularis (needle spike-rush)	F	G	F	F
Eleocharis palustris (common spikesedge)	F	G	F	F
Eleocharis pauciflora (few-flowered spike-rush)	F	G	F	F
Poa pratensis (Kentucky bluegrass)	G	G	G	G
Puccinellia nuttalliana (Nuttall alkaligrass)	F	G	F	G
Scirpus acutus (hardstem bulrush)	G	G	G	F
Scirpus maritimus (alkali bulrush)	G	G	F	F
Scirpus pungens (sharp bulrush)	G	G	G	G
Scirpus validus (softstem bulrush)	G	G	G	G
Spartina gracilis (alkali cordgrass)	G	G	G	G
Spartina pectinata (prairie cordgrass)	G	G	G	G
Trisetum spicatum (spike trisetum)	P	P	P	P
Trisetum wolfii (Wolf's trisetum)	P	P	P	P
Forbs—most forbs are generally poor to fair except for the following species:				
Melilotus alba (white sweetclover)	G	G	G	G
Melilotus officinalis (yellow sweet-clover)	G	G	G	G
Typha angustifolia (hybrid cattail)	G	G	G	F
Typha latifolia (common cattail)	G	G	G	F

APPENDIX A-5. Food value or degree of use for elk, mule deer, whitetail deer, and antelope

Food value refers to the relish and degree of use shown by a wildlife species for a plant or plant part, as well as the plant's availability throughout its range. **G** (Good) = readily to moderately available in the plant's range and consumed to a high degree; **F** (Fair) = readily to moderately available in the plant's range but consumed only to a moderate degree; **P** (Poor) = available but the plant is consumed to only a small degree or not at all.

Species	Elk Food Value	Mule Deer Food Value	Whitetail Deer Food Value	Antelope Food Value
Trees				
Abies lasiocarpa (subalpine fir)	P	P	P	P
Acer negundo (box-elder)	F	P	F	P
Elaeagnus angustifolia (Russian olive)	F	P	F	F
Fraxinus pennsylvanica (green ash)	F	F	F	P
Juniperus scopulorum (Rocky Mountain juniper)	P	P	P	P
Picea engelmannii (Engelmann spruce)	P	P	P	P
Picea glauca (white spruce)	P	P	P	P
Pinus contorta (lodgepole pine)	P	P	P	P
Pinus ponderosa (ponderosa pine)	P	P	P	P
Populus angustifolia (narrowleaf cottonwood)	P	P	P	P
Populus deltoides (Great Plains cottonwood)	P	P	F	P
Populus tremuloides (quaking aspen)	F	F	F	P
Populus trichocarpa (black cottonwood)	P	P	P	P
Pseudotsuga menziesii (Douglas fir)	P	F	P	P
Salix amygdaloides (peach-leaf willow)	G	G	F	P
Shrubs				
Acer glabrum (Rocky Mountain maple)	F	G	F	P
Alnus incana (mountain alder)	P	P	P	P
Amelanchier alnifolia (western serviceberry)	F	G	G	G
Arctostaphylos uva-ursi (kinnikinnick)	F	F	F	P
Artemisia cana (silver sagebrush)	F	F	F	P
Betula glandulosa (bog birch)	P	P	P	P
Betula occidentalis (water birch)	F	P	F	P
Cornus stolonifera (red-osier dogwood)	P	G	G	F
Crataegus douglasii (black hawthorn)	F	F	F	F
Crataegus succulenta (succulent hawthorn)	F	F	F	F
Elaeagnus commutata (silverberry)	G	P	P	F
Kalmia microphylla (small-leaved laurel)	P	P	P	P
Potentilla fruticosa (shrubby cinquefoil)	F	F	F	P
Prunus americana (wild plum)	F	F	F	F
Prunus virginiana (common chokecherry)	F	G	G	F
Rhus aromatica (fragrant sumac)	P	G	P	P
Ribes lacustre (swamp currant)	G	F	F	P
Ribes odoratum (buffalo currant)	F	G	F	F
Ribes setosum (Missouri gooseberry)	P	F	F	P
Rosa acicularis (prickly rose)	F	F	F	G
Rosa woodsii (woods rose)	F	F	F	G
Rubus parviflorus (thimbleberry)	P	P	P	P
Salix bebbiana (Bebb willow)	G	F	F	F
Salix boothii (Booth willow)	F	F	F	F
Salix candida (hoary willow)	F	F	F	P
Salix drummondiana (Drummond willow)	F	F	F	P
Salix exigua (sandbar willow)	G	G	G	F
Salix geyeriana (Geyer willow)	G	F	F	F
Salix lutea (yellow willow)	G	F	F	P

APPENDIX A-5. (cont.)

Species	Elk Food Value	Mule Deer Food Value	Whitetail Deer Food Value	Antelope Food Value
Sarcobatus vermiculatus (black greasewood)	P	P	P	F
Shepherdia argentea (thorny buffaloberry)	F	G	F	P
Shepherdia canadensis (Canada buffaloberry)	P	P	P	F
Spiraea betulifolia (shiny-leaf spiraea)	P	F	F	F
Symphoricarpos albus (common snowberry)	F	F	F	F
Symphoricarpos occidentalis (western snowberry)	F	G	G	F
Vaccinium cespitosum (dwarf huckleberry)	G	G	F	F
Vaccinium scoparium (whortleberry)	P	P	P	P
Graminoids				
Agropyron caninum (bearded wheatgrass)	F	P	P	P
Agropyron repens (quackgrass)	G	G	P	P
Agropyron smithii (western wheatgrass)	G	P	P	P
Agrostis stolonifera (redtop)	G	G	F	P
Beckmannia syzigachne (American sloughgrass)	F	G	P	P
Bromus inermis (smooth brome)	F	F	F	F
Calamagrostis canadensis (bluejoint reedgrass)	F	P	P	P
Calamagrostis rubescens (pinegrass)	P	P	P	P
Calamagrostis stricta (narrow-spiked reedgrass)	F	P	P	P
Carex aquatilis (water sedge)	F	F	F	P
Carex atherodes (awned sedge)	F	F	F	P
Carex lanuginosa (woolly sedge)	F	F	F	F
Carex lasiocarpa (slender sedge)	P	P	P	P
Carex nebrascensis (Nebraska sedge)	F	F	F	P
Carex rostrata (beaked sedge)	F	F	P	P
Carex vesicaria (inflated sedge)	F	P	P	P
Deschampsia cespitosa (tufted hairgrass)	G	F	F	F
Distichlis spicata (inland saltgrass)	P	P	P	P
Eleocharis acicularis (needle spike-rush)	G	F	P	P
Eleocharis palustris (common spikesedge)	F	F	P	P
Eleocharis pauciflora (few-flowered spike-rush)	F	F	P	P
Elymus canadensis (Canada wildrye)	F	F	P	P
Elymus cinereus (basin wildrye)	G	F	F	F
Elymus glaucus (blue wildrye)	G	G	F	P
Glyceria borealis (northern mannagrass)	F	F	P	P
Glyceria grandis (American mannagrass)	F	F	P	P
Glyceria striata (fowl mannagrass)	F	F	P	P
Hordeum jubatum (foxtail barley)	P	P	P	P
Juncus balticus (Baltic rush)	F	P	P	P
Phalaris arundinacea (reed canarygrass)	G	F	F	F
Phleum pratense (common timothy)	F	F	F	P
Phragmites australis (common reed)	P	P	P	F
Poa palustris (fowl bluegrass)	G	G	G	F
Poa pratensis (Kentucky bluegrass)	G	F	G	F
Puccinellia nuttalliana (Nuttall alkaligrass)	G	F	P	F
Scirpus acutus (hardstem bulrush)	P	P	P	P
Scirpus maritimus (alkali bulrush)	P	P	P	P
Scirpus pungens (sharp bulrush)	F	P	P	P
Scirpus validus (softstem bulrush)	P	P	P	P
Spartina gracilis (alkali cordgrass)	P	P	P	P
Spartina pectinata (prairie cordgrass)	P	P	P	P
Stipa occidentalis (western needlegrass)	G	F	P	P

APPENDIX A-5. (cont.)

Species	Elk Food Value	Mule Deer Food Value	Whitetail Deer Food Value	Antelope Food Value
Trisetum spicatum (spike trisetum)	P	P	P	P
Trisetum wolfii (Wolf's trisetum)	P	P	P	P
Forbs				
Achillea millefolium (common yarrow)	P	P	P	P
Actaea rubra (baneberry)	F	F	F	P
Arnica cordifolia (heart-leaf arnica)	F	F	F	F
Aster foliaceus (leafy aster)	G	G	F	F
Cirsium arvense (Canada thistle)	P	F	P	P
Epilobium angustifolium (fireweed)	F	F	F	F
Equisetum arvense (field horsetail)	P	P	P	P
Equisetum laevigatum (smooth scouring-rush)	F	F	P	P
Fragaria virginiana (Virginia strawberry)	F	G	G	P
Galium boreale (northern bedstraw)	P	F	P	P
Geranium richardsonii (white geranium)	G	G	G	P
Geranium viscosissimum (sticky geranium)	G	G	G	P
Geum triflorum (old man's whiskers)	P	P	F	P
Glycyrrhiza lepidota (American licorice)	F	F	F	P
Heracleum lanatum (cow-parsnip)	G	G	G	P
Melilotus alba (white sweetclover)	G	F	F	F
Melilotus officinalis (yellow sweet-clover)	G	G	G	G
Mertensia ciliata (mountain bluebell)	P	P	P	P
Pedicularis groenlandica (elephant's head)	F	F	P	P
Polygonum amphibium (water smartweed)	P	P	P	P
Polygonum lapathifolium (willow weed)	P	P	P	P
Potentilla anserina (common silverweed)	F	G	F	P
Potentilla gracilis (slender cinquefoil)	P	P	P	P
Sagittaria cuneata (arumleaf arrowhead)	P	P	P	P
Senecio triangularis (arrowleaf groundsel)	G	F	F	P
Smilacina stellata (starry Solomon-plume)	P	F	F	P
Solidago canadensis (Canada goldenrod)	P	F	F	P
Taraxacum officinale (common dandelion)	G	F	F	G
Thalictrum occidentale (western meadowrue)	F	F	F	P
Trifolium repens (white clover)	G	G	G	G
Typha angustifolia (hybrid cattail)	P	P	P	P
Typha latifolia (common cattail)	P	P	P	P
Urtica dioica (stinging nettle)	P	P	P	P
Viola adunca (hook violet)	F	F	F	P

APPENDIX A-6. Food value or degree of use for upland game birds, waterfowl, small non-game birds, and small mammals

Food value refers to the relish and degree of use shown by a wildlife species for a plant or plant part, as well as the plant's availability throughout its range. **G** (Good) = readily to moderately available in the plant's range and consumed to a high degree; **F** (Fair) = readily to moderately available in the plant's range but consumed only to a moderate degree; **P** (Poor) = available but the plant is consumed to only a small degree or not at all.

Species	Upland Game Bird Food Value	Waterfowl Food Value	Small Non-Game Bird Food Value	Small Mammal Food Value
Trees				
Abies lasiocarpa (subalpine fir)	F	P	P	F
Acer negundo (box-elder)	F	F	F	F
Elaeagnus angustifolia (Russian olive)	G	G	G	G
Fraxinus pennsylvanica (green ash)	P	P	F	F
Juniperus scopulorum (Rocky Mountain juniper)	F	P	G	P
Picea engelmannii (Engelmann spruce)	F	P	G	G
Picea glauca (white spruce)	F	P	G	G
Pinus contorta (lodgepole pine)	G	P	P	P
Pinus ponderosa (ponderosa pine)	G	P	G	G
Populus angustifolia (narrowleaf cottonwood)	F	P	F	G
Populus deltoides (Great Plains cottonwood)	F	P	G	G
Populus tremuloides (quaking aspen)	G	F	G	G
Populus trichocarpa (black cottonwood)	G	F	G	G
Pseudotsuga menziesii (Douglas fir)	G	P	P	F
Salix amygdaloides (peach-leaf willow)	F	F	F	F
Shrubs				
Acer glabrum (Rocky Mountain maple)	F	P	F	F
Alnus incana (mountain alder)	F	P	G	F
Amelanchier alnifolia (western serviceberry)	F	P	F	F
Artemisia cana (silver sagebrush)	F	P	F	F
Betula glandulosa (bog birch)	F	P	F	F
Betula occidentalis (water birch)	G	F	F	G
Cornus stolonifera (red-osier dogwood)	F	F	F	F
Crataegus douglasii (black hawthorn)	F	P	F	F
Crataegus succulenta (succulent hawthorn)	F	P	F	F
Elaeagnus commutata (silverberry)	F	F	F	F
Lonicera utahensis (Utah honeysuckle)	F	F	G	F
Potentilla fruticosa (shrubby cinquefoil)	P	P	F	F
Prunus americana (wild plum)	G	P	G	F
Prunus virginiana (common chokecherry)	G	P	G	G
Rhus aromatica (fragrant sumac)	G	P	G	G
Ribes lacustre (swamp currant)	G	F	G	G
Ribes odoratum (buffalo currant)	F	P	F	F
Ribes setosum (Missouri gooseberry)	G	P	G	G
Rosa acicularis (prickly rose)	G	P	G	G
Rosa woodsii (woods rose)	G	P	G	G
Rubus parviflorus (thimbleberry)	F	P	F	F
Salix bebbiana (Bebb willow)	G	F	G	G
Salix boothii (Booth willow)	G	F	G	G
Salix drummondiana (Drummond willow)	G	F	F	F
Salix exigua (sandbar willow)	G	F	G	G
Salix geyeriana (Geyer willow)	G	F	G	G
Salix lutea (yellow willow)	G	F	G	G
Sarcobatus vermiculatus (black greasewood)	F	G	G	G

APPENDIX A-6. (cont.)

Species	Upland Game Bird Food Value	Waterfowl Food Value	Small Non-Game Bird Food Value	Small Mammal Food Value
Shepherdia argentea (thorny buffaloberry)	F	F	F	F
Shepherdia canadensis (Canada buffaloberry)	G	F	F	G
Spiraea betulifolia (shiny-leaf spiraea)	P	P	P	P
Symphoricarpos albus (common snowberry)	F	F	F	F
Symphoricarpos occidentalis (western snowberry)	F	F	F	F
Vaccinium cespitosum (dwarf huckleberry)	F	P	F	G
Vaccinium scoparium (whortleberry)	F	P	P	P
Graminoids				
Agropyron caninum (bearded wheatgrass)	F	G	F	F
Agropyron repens (quackgrass)	G	G	G	F
Agropyron smithii (western wheatgrass)	P	G	P	P
Agrostis stolonifera (redtop)	F	F	F	F
Beckmannia syzigachne (American sloughgrass)	F	G	F	F
Bromus inermis (smooth brome)	G	F	G	G
Calamagrostis canadensis (bluejoint reedgrass)	P	G	P	P
Carex aquatilis (water sedge)	P	F	F	F
Carex atherodes (awned sedge)	P	F	F	F
Carex lanuginosa (woolly sedge)	F	F	F	F
Carex lasiocarpa (slender sedge)	F	F	F	F
Carex nebrascensis (Nebraska sedge)	P	G	G	G
Carex rostrata (beaked sedge)	F	F	G	G
Carex vesicaria (inflated sedge)	F	F	G	G
Deschampsia cespitosa (tufted hairgrass)	F	G	P	P
Distichlis spicata (inland saltgrass)	F	G	F	P
Eleocharis acicularis (needle spike-rush)	F	G	G	F
Eleocharis palustris (common spikesedge)	P	G	F	F
Eleocharis pauciflora (few-flowered spike-rush)	P	G	F	F
Elymus canadensis (Canada wildrye)	F	F	P	P
Elymus cinereus (basin wildrye)	F	F	P	P
Glyceria borealis (northern mannagrass)	G	G	F	G
Glyceria grandis (American mannagrass)	G	G	F	G
Glyceria striata (fowl mannagrass)	F	F	F	G
Juncus balticus (Baltic rush)	G	G	F	F
Phalaris arundinacea (reed canarygrass)	F	F	F	F
Phleum pratense (common timothy)	F	G	F	F
Phragmites australis (common reed)	G	G	G	G
Poa palustris (fowl bluegrass)	F	F	F	F
Poa pratensis (Kentucky bluegrass)	F	G	F	F
Puccinellia nuttalliana (Nuttall alkaligrass)	F	F	F	F
Scirpus acutus (hardstem bulrush)	G	G	G	F
Scirpus maritimus (alkali bulrush)	P	G.	G	G
Scirpus pungens (sharp bulrush)	G	G	G	G
Scirpus validus (softstem bulrush)	G	G	G	G
Spartina gracilis (alkali cordgrass)	P	P	P	P
Spartina pectinata (prairie cordgrass)	P	P	F	F
Forbs				
Achillea millefolium (common yarrow)	P	P	P	P
Actaea rubra (baneberry)	P	P	F	F
Arnica cordifolia (heart-leaf arnica)	P	P	P	P
Aster foliaceus (leafy aster)	F	F	G	G

APPENDIX A-6. (cont.)

Species	Upland Game Bird Food Value	Waterfowl Food Value	Small Non-Game Bird Food Value	Small Mammal Food Value
Cirsium arvense (Canada thistle)	F	P	F	P
Epilobium angustifolium (fireweed)	F	P	F	P
Equisetum arvense (field horsetail)	P	P	P	P
Equisetum laevigatum (smooth scouring-rush)	P	P	P	F
Fragaria virginiana (Virginia strawberry)	P	P	P	F
Galium boreale (northern bedstraw)	P	P	P	P
Galium trifidum (small bedstraw)	P	P	P	P
Galium triflorum (sweetscented bedstraw)	P	P	P	P
Geranium richardsonii (white geranium)	F	P	F	F
Geranium viscosissimum (sticky geranium)	F	P	F	F
Geum triflorum (old man's whiskers)	P	P	P	P
Glycyrrhiza lepidota (American licorice)	F	F	F	F
Heracleum lanatum (cow-parsnip)	F	F	P	P
Melilotus alba (white sweetclover)	F	G	F	F
Melilotus officinalis (yellow sweet-clover)	F	G	F	F
Mertensia ciliata (mountain bluebell)	F	P	F	F
Osmorhiza chilensis (mountain sweet-cicely)	F	F	G	G
Polygonum amphibium (water smartweed)	F	G	F	F
Polygonum lapathifolium (willow weed)	F	G	F	F
Potentilla anserina (common silverweed)	P	P	F	F
Potentilla gracilis (slender cinquefoil)	P	P	P	P
Sagittaria cuneata (arumleaf arrowhead)	P	P	P	P
Senecio triangularis (arrowleaf groundsel)	F	P	G	G
Smilacina stellata (starry Solomon-plume)	F	P	F	F
Solidago canadensis (Canada goldenrod)	F	P	F	F
Taraxacum officinale (common dandelion)	G	F	F	F
Trifolium repens (white clover)	G	F	F	F
Typha angustifolia (hybrid cattail)	G	G	G	F
Typha latifolia (common cattail)	G	G	G	F
Viola adunca (hook violet)	P	P	P	P

APPENDIX A-7. Potential biomass production, erosion control potential, short-term revegetation potential, and long-term revegetation potential

Potential biomass production refers to the relative genetic ability of a plant to produce plant material by weight on an annual basis ***compared to other members of the same lifeform*** (e.g., a grass is rated against other grasses). Species are rated as if they were growing on typical sites. Therefore, a plant may have a higher or lower biomass production than the rating given if it occurs on a site more favorable or less favorable than its normal site. **H** (High) = plant possesses ability to produce a greater yield of dry plant material than most other species of the same lifeform; **M** (Medium) = plant produces an average yield of dry plant material as compared to other species of the same lifeform; **L** (Low) = plant produces a low yield of dry plant material as compared to other species of the same lifeform; **V** (Very Low) = plant produces a very low yield of dry plant material as compared to other species of the same lifeform.

Erosion control potential refers to a plant that commonly exhibits growth habit, plant structure, biomass, and/or root system that has the potential to reduce soil erosion. **H** (High) = plant that has aggressive growth habits, persistent plant structure, high potential biomass, and/or good soil-binding root-rhizome-runner system in established stands; **M** (Medium) = plant that has moderately aggressive growth, moderately persistent plant structure, moderate potential biomass, and/or moderate soil-binding root-rhizome-runner system in established stands; **L** (Low) = plant that has poor growth, persistence, biomass, and/or soil-binding root system that makes it generally inadequate for erosion control.

Short-term revegetation potential refers to the ability of a plant to become quickly established and exhibit rapid growth within 1 to 3 years (includes annuals). **H** (High) = plant demonstrates rapid growth, good cover, and good reproduction; **M** (Medium) = plant demonstrates moderately rapid growth, fair cover, and fair reproduction; **L** (Low) = plant demonstrates slow growth, poor cover, and poor reproduction.

Long-term revegetation potential refers to the ability of a plant to become established and persist over a period of more than 3 years. **H** (High) = plant demonstrates good growth, cover, reproduction, and stand maintenance characteristics; **M** (Medium) = plant demonstrates fair growth, cover, reproduction, and stand maintenance characteristics; **L** (Low) = plant demonstrates poor growth, cover, reproduction, and stand maintenance characteristics.

Species	Potential Biomass Production	Erosion Control Potential	Short-Term Revegetation Potential	Long-Term Reveg. Potential
Trees				
Abies lasiocarpa (subalpine fir)	H	M	L	M
Acer negundo (box-elder)	M	M	L	L
Elaeagnus angustifolia (Russian olive)	H	M	L	H
Fraxinus pennsylvanica (green ash)	H	M	L	M
Juniperus scopulorum (Rocky Mountain juniper)	M	L	L	M
Picea engelmannii (Engelmann spruce)	H	M	L	M
Picea glauca (white spruce)	H	M	L	M
Pinus contorta (lodgepole pine)	H	L	L	M
Pinus ponderosa (ponderosa pine)	H	M	L	M
Populus angustifolia (narrowleaf cottonwood)	H	H	L	H
Populus deltoides (Great Plains cottonwood)	H	H	M	H
Populus tremuloides (quaking aspen)	M	H	L	H
Populus trichocarpa (black cottonwood)	H	H	L	M
Pseudotsuga menziesii (Douglas fir)	H	M	L	H
Salix amygdaloides (peach-leaf willow)	M	H	L	M
Thuja plicata (western red cedar)	H	M	L	M
Shrubs				
Acer glabrum (Rocky Mountain maple)	M	M	L	M
Alnus incana (mountain alder)	M	H	L	M
Amelanchier alnifolia (western serviceberry)	M	M	L	M
Artemisia cana (silver sagebrush)	M	M	L	M
Betula glandulosa (bog birch)	M	H	L	H
Betula occidentalis (water birch)	M	H	L	M
Clematis ligusticifolia (western virgins-bower)	M	M	L	L
Cornus stolonifera (red-osier dogwood)	M	H	L	H
Crataegus douglasii (black hawthorn)	M	M	L	M
Crataegus succulenta (succulent hawthorn)	M	M	L	M
Elaeagnus commutata (silverberry)	M	M	L	M
Kalmia microphylla (small-leaved laurel)	L	M	L	M
Ledum glandulosum (Labrador tea)	L	M	L	M
Lonicera utahensis (Utah honeysuckle)	M	M	L	M
Potentilla fruticosa (shrubby cinquefoil)	H	M	L	M
Prunus americana (wild plum)	M	M	L	M
Prunus virginiana (common chokecherry)	H	M	L	H
Rhus aromatica (fragrant sumac)	M	M	L	M
Ribes lacustre (swamp currant)	M	M	L	M
Ribes odoratum (buffalo currant)	M	M	L	M
Ribes setosum (Missouri gooseberry)	M	M	L	M
Rosa acicularis (prickly rose)	M	H	L	M
Rosa woodsii (woods rose)	M	H	L	M
Rubus parviflorus (thimbleberry)	M	M	L	M
Salix bebbiana (Bebb willow)	M	H	L	M
Salix boothii (Booth willow)	H	H	L	M

APPENDIX A-7. (cont.)

Species	Potential Biomass Production	Erosion Control Potential	Short-Term Revegetation Potential	Long-Term Reveg. Potential
Salix candida (hoary willow)	M	H	L	M
Salix commutata (undergreen willow)	M	H	L	M
Salix drummondiana (Drummond willow)	H	H	L	M
Salix exigua (sandbar willow)	M	H	L	M
Salix geyeriana (Geyer willow)	H	H	L	M
Salix lasiandra (Pacific willow)	H	H	L	M
Salix lutea (yellow willow)	H	H	L	M
Salix planifolia (planeleaf willow)	M	H	L	M
Salix wolfii (Wolf's willow)	M	H	L	M
Sarcobatus vermiculatus (black greasewood)	M	M	L	M
Shepherdia argentea (thorny buffaloberry)	H	M	L	M
Shepherdia canadensis (Canada buffaloberry)	H	M	L	M
Spiraea betulifolia (shiny-leaf spiraea)	M	M	L	M
Symphoricarpos albus (common snowberry)	M	M	L	M
Symphoricarpos occidentalis (western snowberry)	M	M	L	M
Vaccinium cespitosum (dwarf huckleberry)	M	M	L	M
Vaccinium scoparium (whortleberry)	M	M	L	M
Graminoids				
Agropyron caninum (bearded wheatgrass)	M	M	M	H
Agropyron repens (quackgrass)	M	H	M	H
Agropyron smithii (western wheatgrass)	M	H	M	H
Agrostis stolonifera (redtop)	M	H	H	H
Beckmannia syzigachne (American sloughgrass)	M	M	M	M
Bromus anomalus (nodding brome)	M	M	M	H
Bromus ciliatus (fringed brome)	M	M	M	H
Bromus inermis (smooth brome)	H	H	M	H
Calamagrostis canadensis (bluejoint reedgrass)	M	H	L	H
Calamagrostis rubescens (pinegrass)	M	M	L	M
Calamagrostis stricta (narrow-spiked reedgrass)	M	H	L	H
Carex aquatilis (water sedge)	H	H	M	M
Carex atherodes (awned sedge)	H	H	M	M
Carex buxbaumii (Buxbaum's sedge)	M	M	L	M
Carex lanuginosa (woolly sedge)	M	H	M	M
Carex lasiocarpa (slender sedge)	M	H	M	M
Carex lenticularis (lentil-fruit sedge)	H	H	M	M
Carex limosa (mud sedge)	M	M	L	M
Carex livida (pale sedge)	M	M	L	M
Carex nebrascensis (Nebraska sedge)	M	H	L	M
Carex rostrata (beaked sedge)	H	H	M	H
Carex scopulorum (Holm's Rocky Mountain sedge)	M	H	L	M
Carex vesicaria (inflated sedge)	H	H	M	H
Deschampsia cespitosa (tufted hairgrass)	M	L	L	M
Distichlis spicata (inland saltgrass)	M	M	L	M
Eleocharis acicularis (needle spike-rush)	L	H	M	L
Eleocharis palustris (common spikesedge)	M	H	H	M
Eleocharis pauciflora (few-flowered spike-rush)	M	H	H	M
Elymus canadensis (Canada wildrye)	H	M	M	M
Elymus cinereus (basin wildrye)	H	H	M	H
Elymus glaucus (blue wildrye)	M	M	M	H
Festuca idahoensis (Idaho fescue)	M	M	L	M
Glyceria borealis (northern mannagrass)	M	M	M	M
Glyceria grandis (American mannagrass)	H	M	M	M

APPENDIX A-7. (cont.)

Species	Potential Biomass Production	Erosion Control Potential	Short-Term Revegetation Potential	Long-Term Reveg. Potential
Glyceria striata (fowl mannagrass)	L	M	L	M
Hordeum jubatum (foxtail barley)	M	L	M	L
Juncus balticus (Baltic rush)	M	M	L	M
Phalaris arundinacea (reed canarygrass)	H	H	M	H
Phleum alpinum (alpine timothy)	M	M	L	M
Phleum pratense (common timothy)	M	M	M	H
Phragmites australis (common reed)	H	H	M	H
Poa palustris (fowl bluegrass)	M	M	M	M
Poa pratensis (Kentucky bluegrass)	M	L	M	H
Puccinellia nuttalliana (Nuttall alkaligrass)	M	M	L	M
Scirpus acutus (hardstem bulrush)	H	M	M	M
Scirpus maritimus (alkali bulrush)	M	M	L	M
Scirpus pungens (sharp bulrush)	H	M	M	M
Scirpus validus (softstem bulrush)	H	M	M	M
Spartina gracilis (alkali cordgrass)	H	H	M	H
Spartina pectinata (prairie cordgrass)	H	H	M	H
Stipa occidentalis (western needlegrass)	M	M	M	H
Trisetum spicatum (spike trisetum)	M	M	L	M
Forbs				
Achillea millefolium (common yarrow)	L	L	H	M
Actaea rubra (baneberry)	M	L	L	L
Aralia nudicaulis (wild sarsaparilla)	M	M	L	M
Arnica cordifolia (heart-leaf arnica)	L	L	L	L
Arnica latifolia (broadleaf arnica)	L	L	L	L
Caltha leptosepala (elkslip marshmarigold)	M	M	L	L
Cirsium arvense (Canada thistle)	M	M	L	M
Epilobium angustifolium (fireweed)	H	L	H	M
Epilobium ciliatum (common willow-herb)	L	L	M	M
Equisetum arvense (field horsetail)	L	M	H	M
Equisetum fluviatile (water horsetail)	M	M	H	M
Equisetum laevigatum (smooth scouring-rush)	L	M	H	M
Fragaria virginiana (Virginia strawberry)	L	L	L	L
Galium boreale (northern bedstraw)	L	L	L	L
Galium trifidum (small bedstraw)	L	L	L	L
Galium triflorum (sweetscented bedstraw)	L	L	L	L
Geranium richardsonii (white geranium)	M	M	M	M
Geranium viscosissimum (sticky geranium)	M	M	L	L
Geum macrophyllum (large-leaved avens)	M	L	L	L
Geum triflorum (old man's whiskers)	M	L	L	L
Glycyrrhiza lepidota (American licorice)	M	M	L	L
Heracleum lanatum (cow-parsnip)	H	M	L	L
Melilotus alba (white sweetclover)	H	M	H	M
Melilotus officinalis (yellow sweet-clover)	H	M	H	M
Mertensia ciliata (mountain bluebell)	M	M	L	M
Mertensia paniculata (panicle bluebells)	M	M	L	M
Pedicularis groenlandica (elephant's head)	L	L	L	L
Polygonum amphibium (water smartweed)	M	M	M	M
Polygonum bistortoides (American bistort)	L	L	L	L
Polygonum lapathifolium (willow weed)	M	L	L	L
Potentilla anserina (common silverweed)	L	M	M	M
Potentilla diversifolia (diverse-leaved cinquefoil)	L	M	M	M
Potentilla gracilis (slender cinquefoil)	M	L	M	M

APPENDIX A-7. (cont.)

Species	Potential Biomass Production	Erosion Control Potential	Short-Term Revegetation Potential	Long-Term Reveg. Potential
Sagittaria cuneata (arumleaf arrowhead)	M	L	L	L
Senecio hydrophilus (alkali-marsh butterweed)	M	M	L	L
Senecio triangularis (arrowleaf groundsel)	M	M	L	L
Smilacina stellata (starry Solomon-plume)	L	L	L	L
Solidago canadensis (Canada goldenrod)	M	M	M	M
Sparganium emersum (simplestem bur-reed)	M	M	L	L
Taraxacum officinale (common dandelion)	L	L	L	L
Thalictrum occidentale (western meadowrue)	M	L	L	L
Trifolium repens (white clover)	L	L	M	H
Triglochin maritimum (seaside arrow-grass)	M	L	L	L
Typha angustifolia (hybrid cattail)	H	H	L	H
Typha latifolia (common cattail)	H	H	L	H
Urtica dioica (stinging nettle)	H	M	L	L
Viola adunca (hook violet)	L	L	L	L
Viola orbiculata (round-leaved violet)	L	L	L	L

APPENDIX B. RIPARIAN AND WETLAND INDICATOR SPECIES OF IDAHO STUDY AREA

Scientific Name	Common Name	Six-Letter Code
Trees		
Abies lasiocarpa	subalpine fir	ABILAS
Acer negundo	box-elder	ACENEG
Elaeagnus angustifolia	Russian olive	ELAANG
Juniperus osteosperma	Utah juniper	JUNOST
Juniperus scopulorum	Rocky Mountain juniper	JUNSCO
Picea engelmannii	Engelmann spruce	PICENG
Picea glauca	white spruce	PICGLA
Pinus flexilis	limber pine	PINFLE
Populus angustifolia	narrowleaf cottonwood	POPANG
Populus tremuloides	quaking aspen	POPTRE
Populus trichocarpa	black cottonwood	POPTRI
Pseudotsuga menziesii	Douglas fir	PSEMEN
Salix amygdaloides	peach-leaf willow	SALAMY
Shrubs		
Acer glabrum	Rocky Mountain maple	ACEGLA
Acer grandidentatum	big-tooth maple	ACEGRA
Alnus incana	mountain alder	ALNINC
Betula occidentalis	water birch	BETOCC
Cornus stolonifera	red-osier dogwood	CORSTO
Crataegus douglasii	black hawthorn	CRADOU
Crataegus succulenta	succulent hawthorn	CRASUC
Prunus virginiana	common chokecherry	PRUVIR
Rhus aromatica	fragrant sumac	RHUARO
Rosa acicularis	prickly rose	ROSACI
Rosa woodsii	woods rose	ROSWOO
Salix bebbiana	Bebb willow	SALBEB
Salix boothii	Booth willow	SALBOO
Salix drummondiana	Drummond willow	SALDRU
Salix exigua	sandbar willow	SALEXI
Salix geyeriana	Geyer willow	SALGEY
Salix lasiandra	Pacific willow	SALLAS
Salix lutea	yellow willow	SALLUT
Symphoricarpos albus	common snowberry	SYMALB
Symphoricarpos occidentalis	western snowberry	SYMOCC
Graminoids		
Agrostis stolonifera	redtop	AGRSTO
Bromus inermis	smooth brome	BROINE
Calamagrostis canadensis	bluejoint reedgrass	CALCAN
Calamagrostis stricta	narrow-spiked reedgrass	CALSTR
Carex aquatilis	water sedge	CARAQU
Carex atherodes	awned sedge	CARATH
Carex lanuginosa	woolly sedge	CARLAN
Carex lasiocarpa	slender sedge	CARLAS
Carex nebrascensis	Nebraska sedge	CARNEB
Carex rostrata	beaked sedge	CARROS
Carex vesicaria	inflated sedge	CARVES
Deschampsia cespitosa	tufted hairgrass	DESCES
Eleocharis acicularis	needle spike-rush	ELEACI
Eleocharis palustris	common spikesedge	ELEPAL
Glyceria grandis	American mannagrass	GLYGRA
Hordeum jubatum	foxtail barley	HORJUB
Juncus balticus	Baltic rush	JUNBAL
Phalaris arundinacea	reed canarygrass	PHAARU
Phragmites australis	common reed	PHRCOM

APPENDIX B (cont.)

Scientific Name	Common Name	Six-Letter Code
Poa pratensis	Kentucky bluegrass	POAPRA
Scirpus acutus	hardstem bulrush	SCIACU
Scirpus americanus	American bulrush	SCIAME
Scirpus pungens	sharp bulrush	SCIPUN
Scirpus validus	softstem bulrush	SCIVAL
Forbs		
Actaea rubra	baneberry	ACTRUB
Equisetum arvense	field horsetail	EQUARV
Galium triflorum	sweetscented bedstraw	GALTRI
Gymnocarpium dryopteris	oak-fern	GYMDRY
Heracleum lanatum	cow-parsnip	HERLAN
Mitella breweri	Brewer's mitrewort	MITBRE
Mitella pentandra	five-stamened mitrewort	MITPEN
Osmorhiza occidentalis	western sweet-cicely	OSMOCC
Polygonum amphibium	water smartweed	POLAMP
Senecio triangularis	arrowleaf groundsel	SENTRI
Streptopus amplexifolius	clasping-leaved twisted stalk	STRAMP
Typha angustifolia	narrow-leaved cattail	TYPANG
Typha latifolia	common cattail	TYPLAT
Xanthium strumarium	common cocklebur	XANSTR

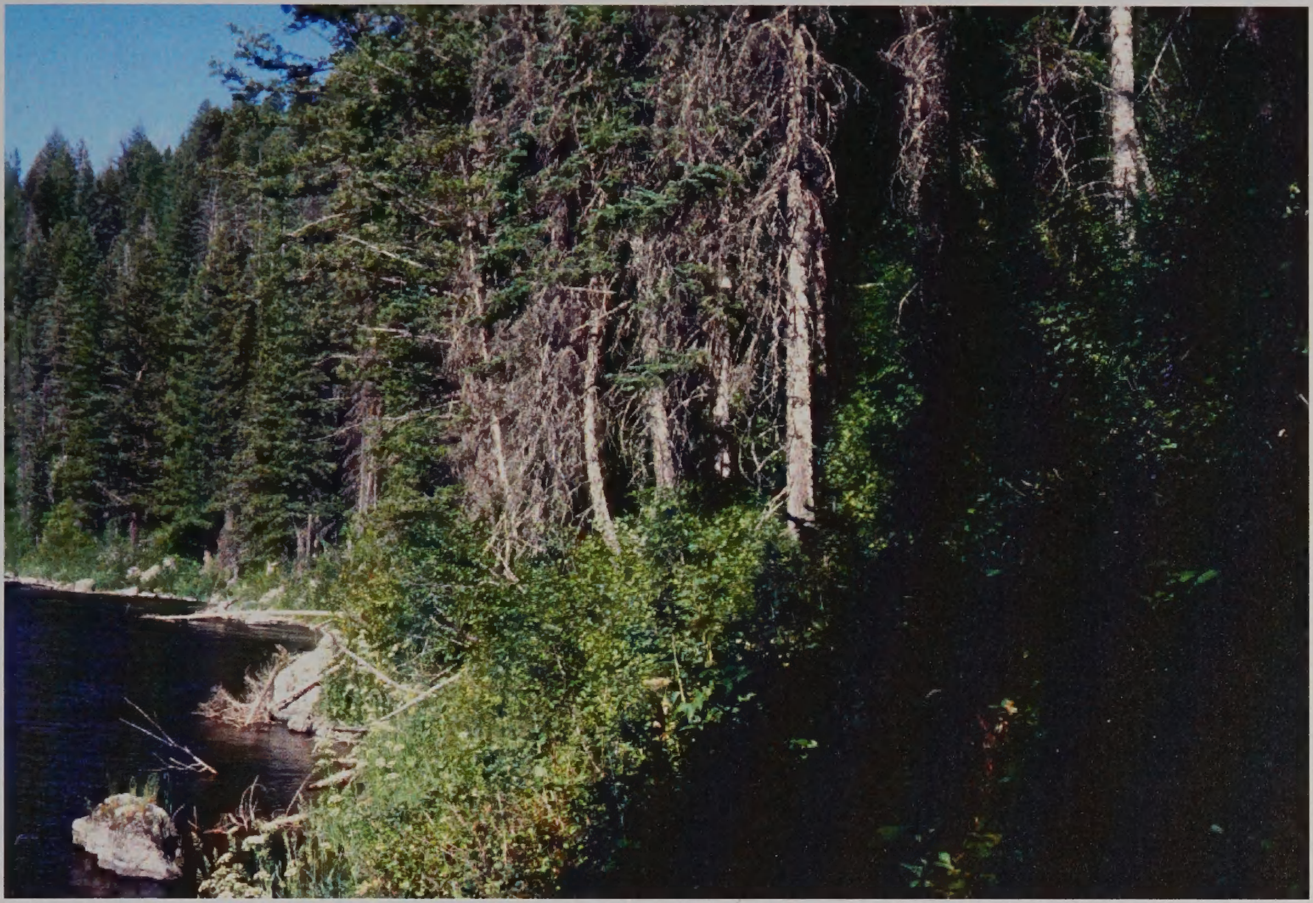
APPENDIX C. POTENTIAL RIPARIAN AND WETLAND HABITAT TYPES AND COMMUNITY TYPES OF THE IDAHO STUDY AREA

Deciduous Forest Types
Fraxinus pennsylvanica/Cornus stolonifera (Green Ash/Red-osier Dogwood) habitat type

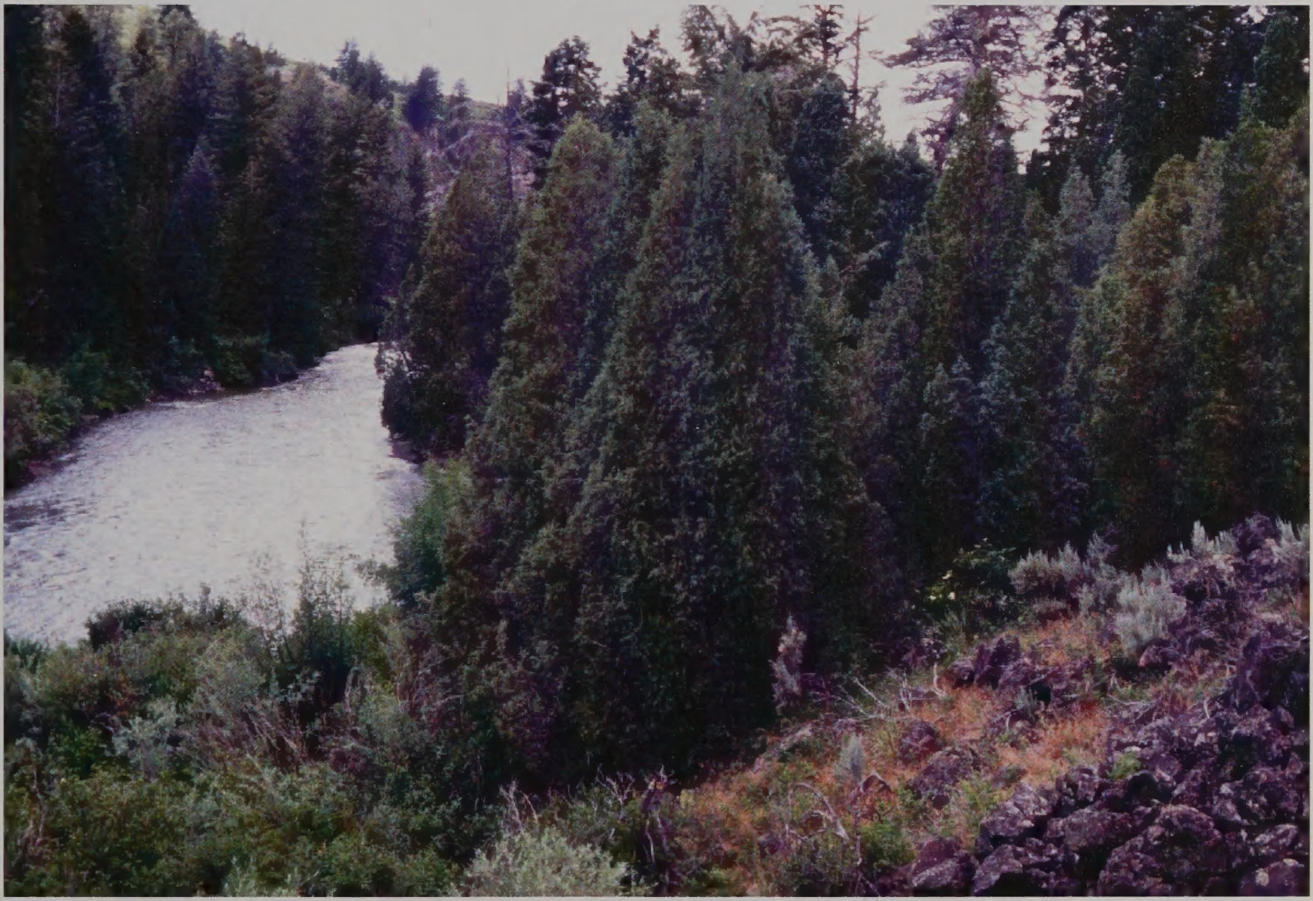
Non-Willow Shrub Types
Potentilla fruticosa/Deschampsia cespitosa (Shrubby Cinquefoil/Tufted Hairgrass) habitat type
Ribes odoratum (Buffalo Currant) community type

Non-Sedge Types
Agropyron smithii (Western Wheatgrass) habitat type
Scirpus maritimus (Alkali Bulrush) habitat type
Sparganium emersum (Simplestem Bur-reed) habitat type
Veratrum californicum (California False Hellebore) community type
Wyethia amplexicaulis (Northern Mule's-ears) community type

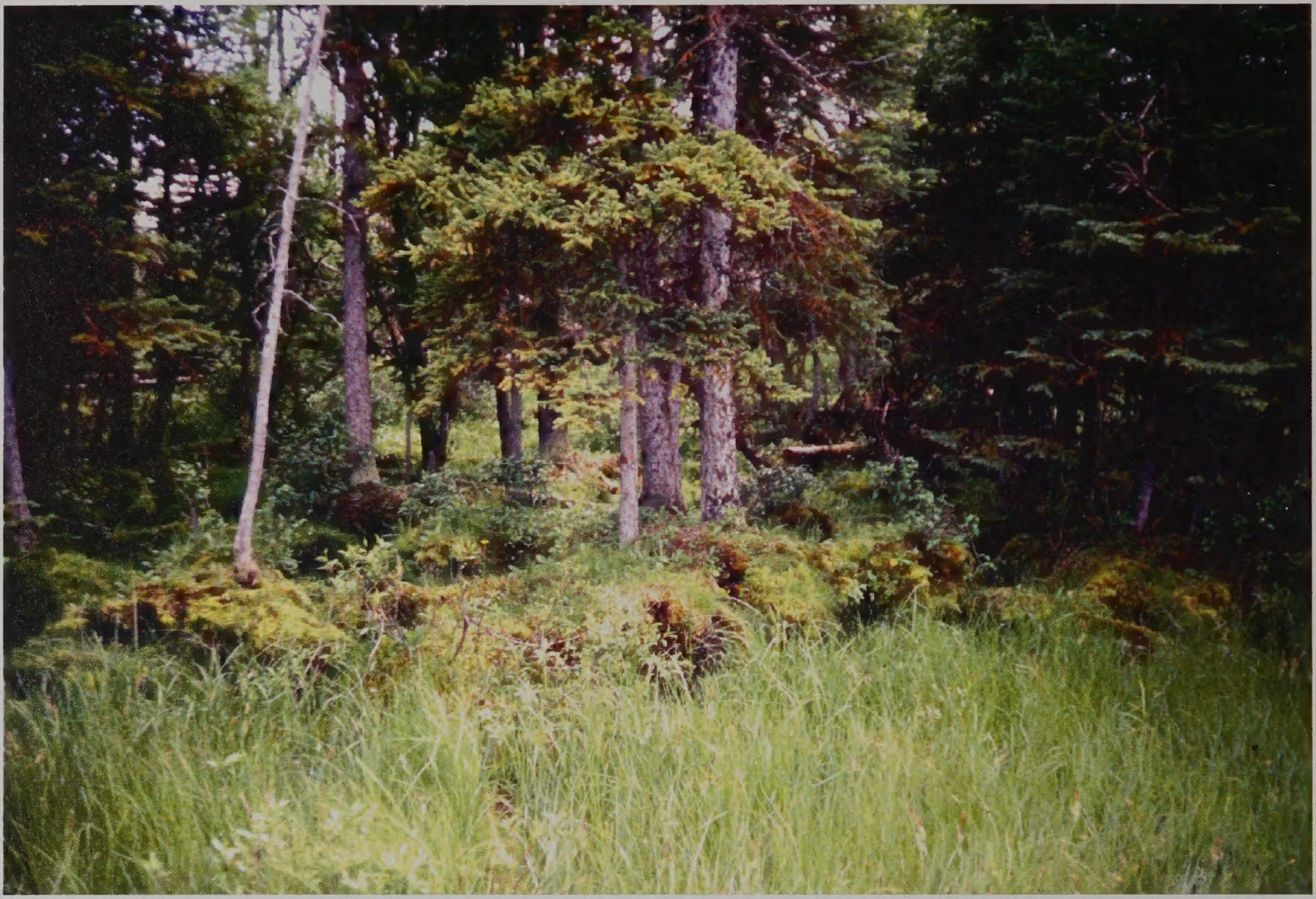
APPENDIX D. PHOTOGRAPHS OF SELECTED HABITAT TYPES AND COMMUNITY TYPES



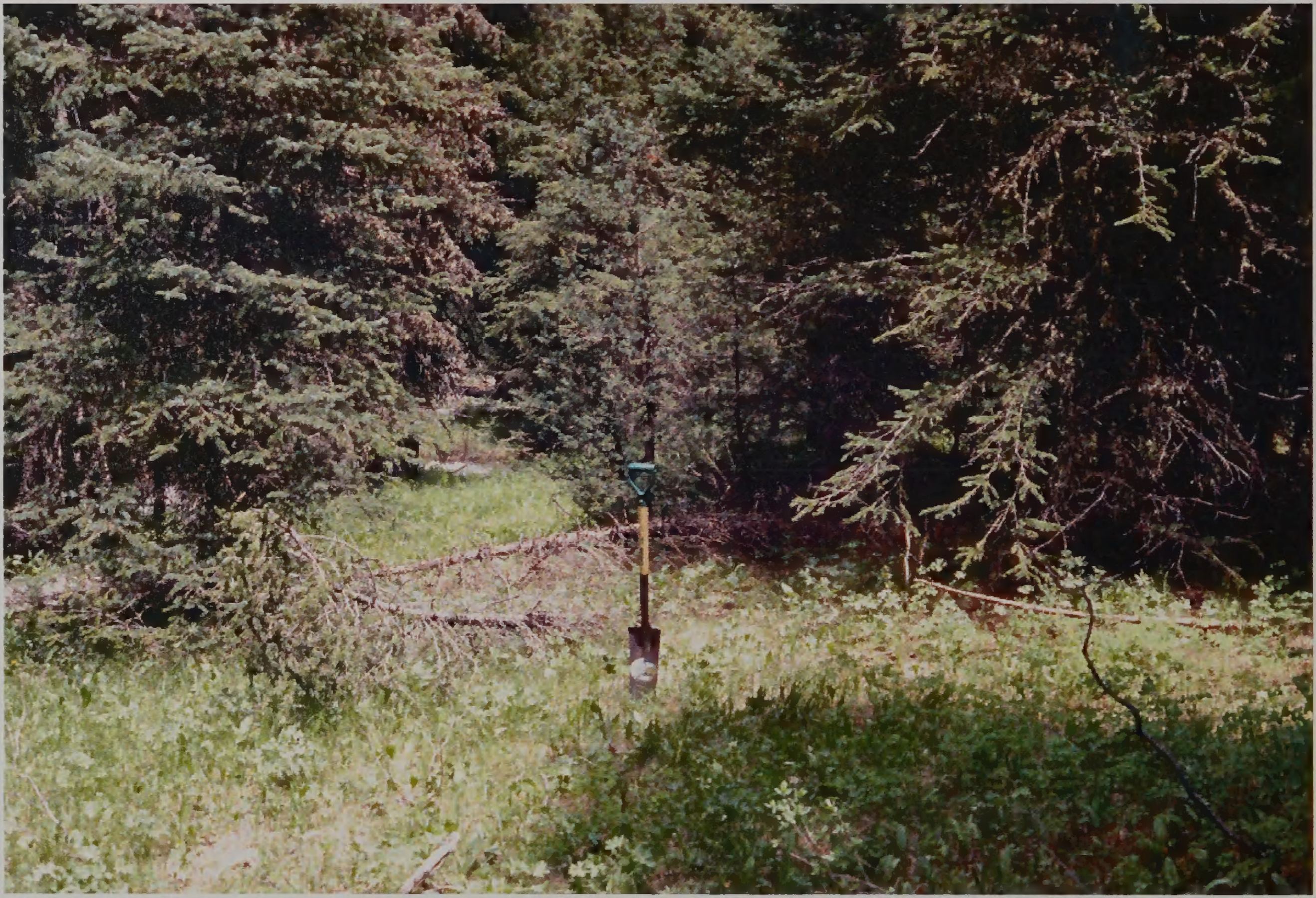
This stand of the ***Abies lasiocarpa/Streptopus amplexifolius* (Subalpine Fir/Twisted Stalk) Habitat Type** is found along the Henry's Fork at 1,559 m (5,115 ft) in elevation. The mid-seral stand has varying amounts of *Pseudotsuga menziesii* (Douglas Fir) and *Pinus contorta* (Lodgepole Pine) present.



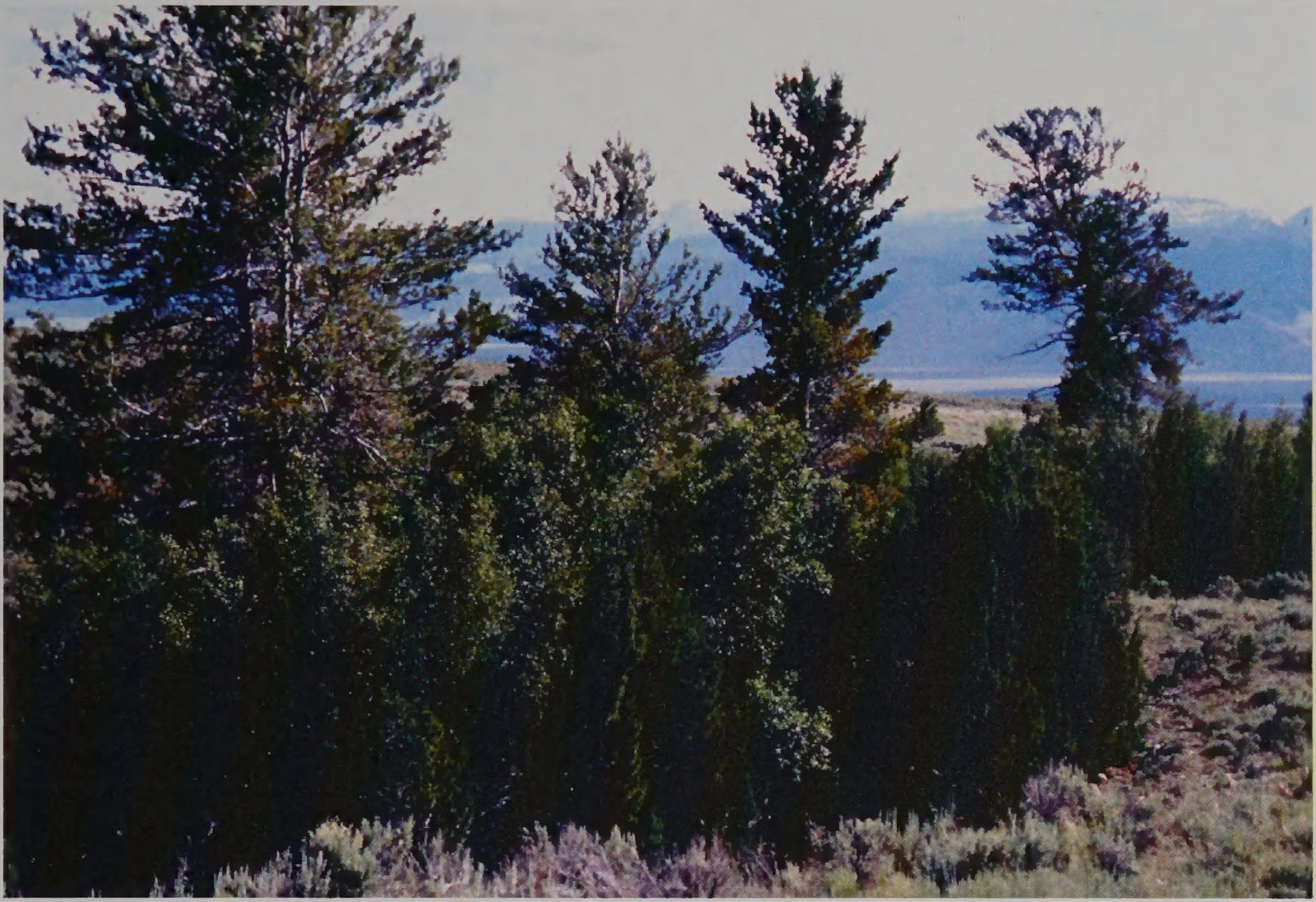
This stand of the ***Juniperus scopulorum/Cornus stolonifera* (Rocky Mountain Juniper/Red-Osier Dogwood) Habitat Type** is found along the Blackfoot River at 1,660 m (5,445 ft) in elevation.



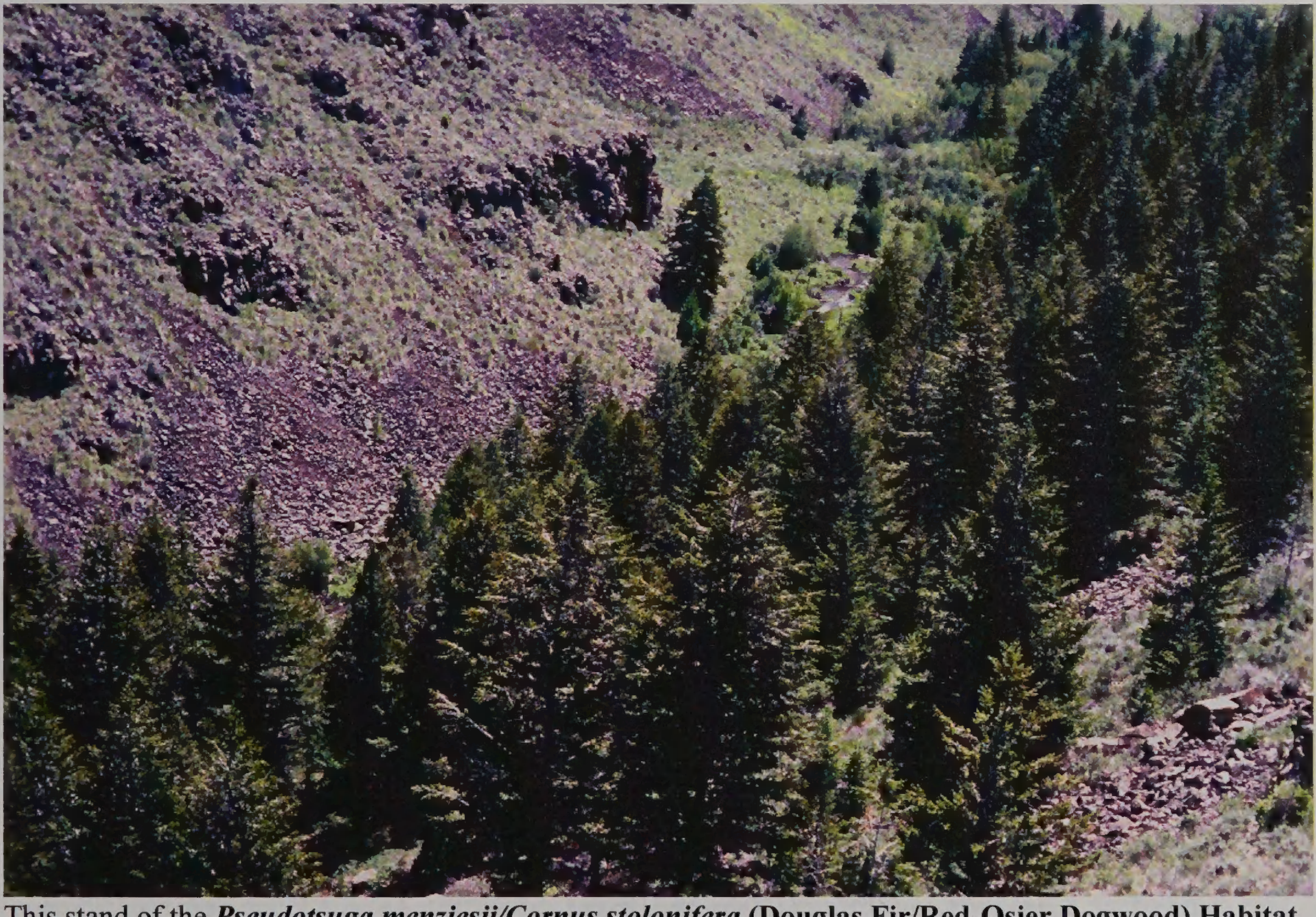
This stand of the ***Picea/Cornus stolonifera*** **(Spruce/Red-Osier Dogwood) Habitat Type** is found near Henry's Lake at around 1,981 m (6,500 ft) in elevation. Varying amounts of *Salix boothii* (Booth Willow) is present in the stand.



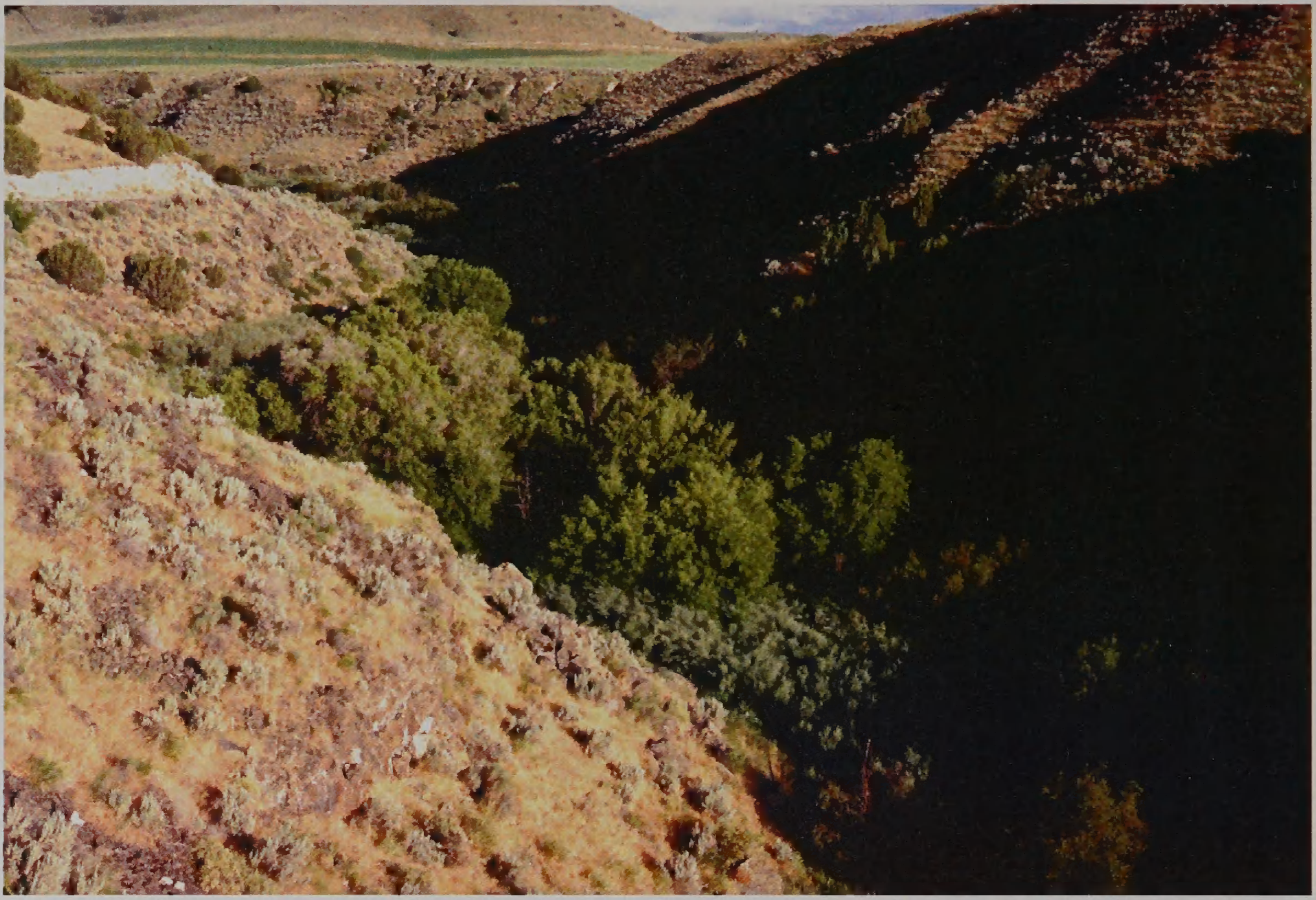
This stand of the ***Picea/Galium triflorum*** **(Spruce/Sweetscented Bedstraw) Habitat Type** is found along Tar Creek at around 2,128 m (6,980 ft) in elevation. The stand represents a late seral/climax stand for this habitat type.



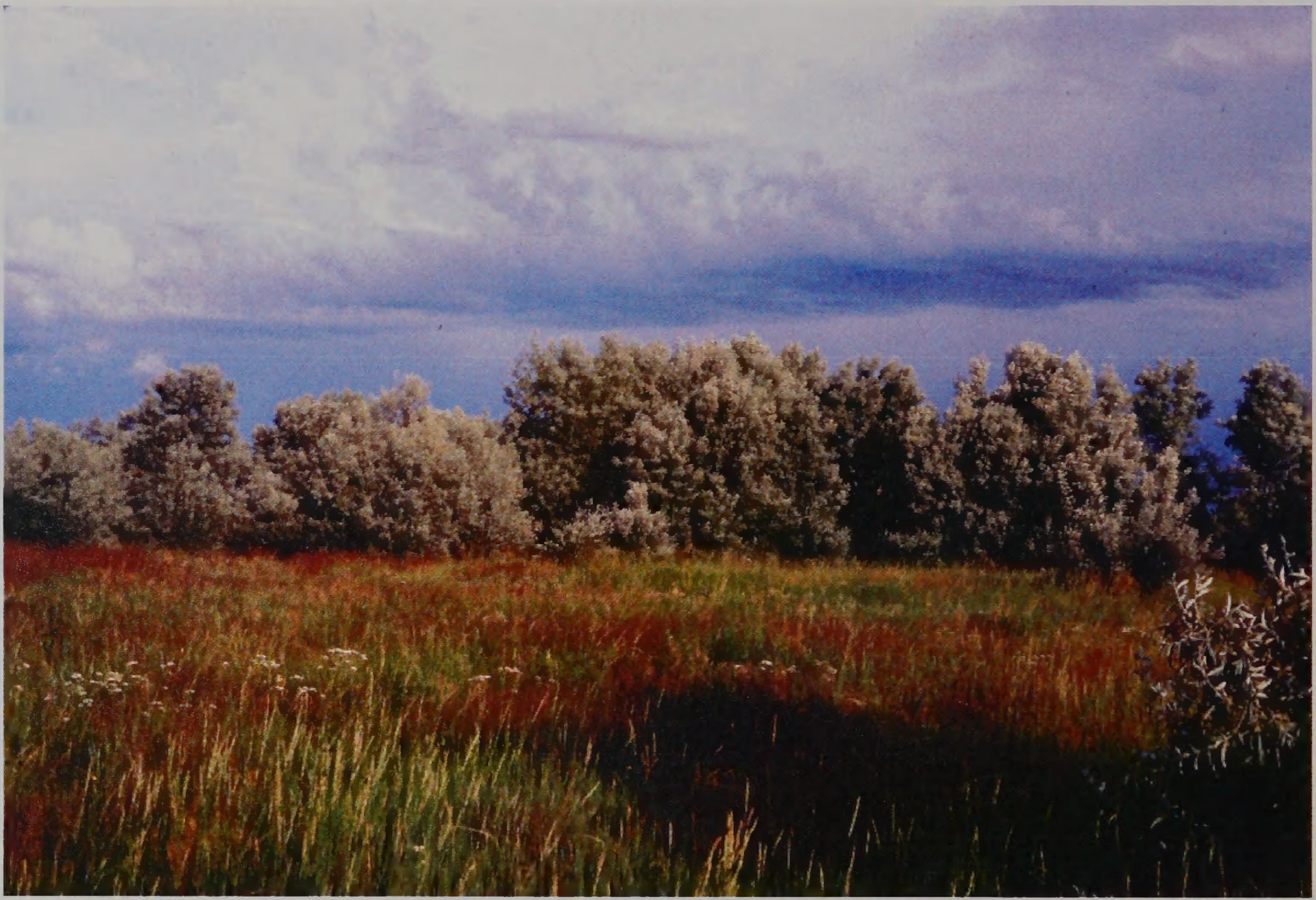
This stand of the ***Pinus flexilis*** **(Limber Pine) Community Type** is found along Badger Creek at around 1,951 m (6,400 ft) in elevation. *Juniperus scopulorum* (Rocky Mountain Juniper) is commonly found in association with this community type.



This stand of the ***Pseudotsuga menziesii/Cornus stolonifera*** **(Douglas Fir/Red-Osier Dogwood) Habitat Type** is found along Indian Creek at around 1,951 m (6,400 ft) in elevation. The stand occupies a narrow canyon.



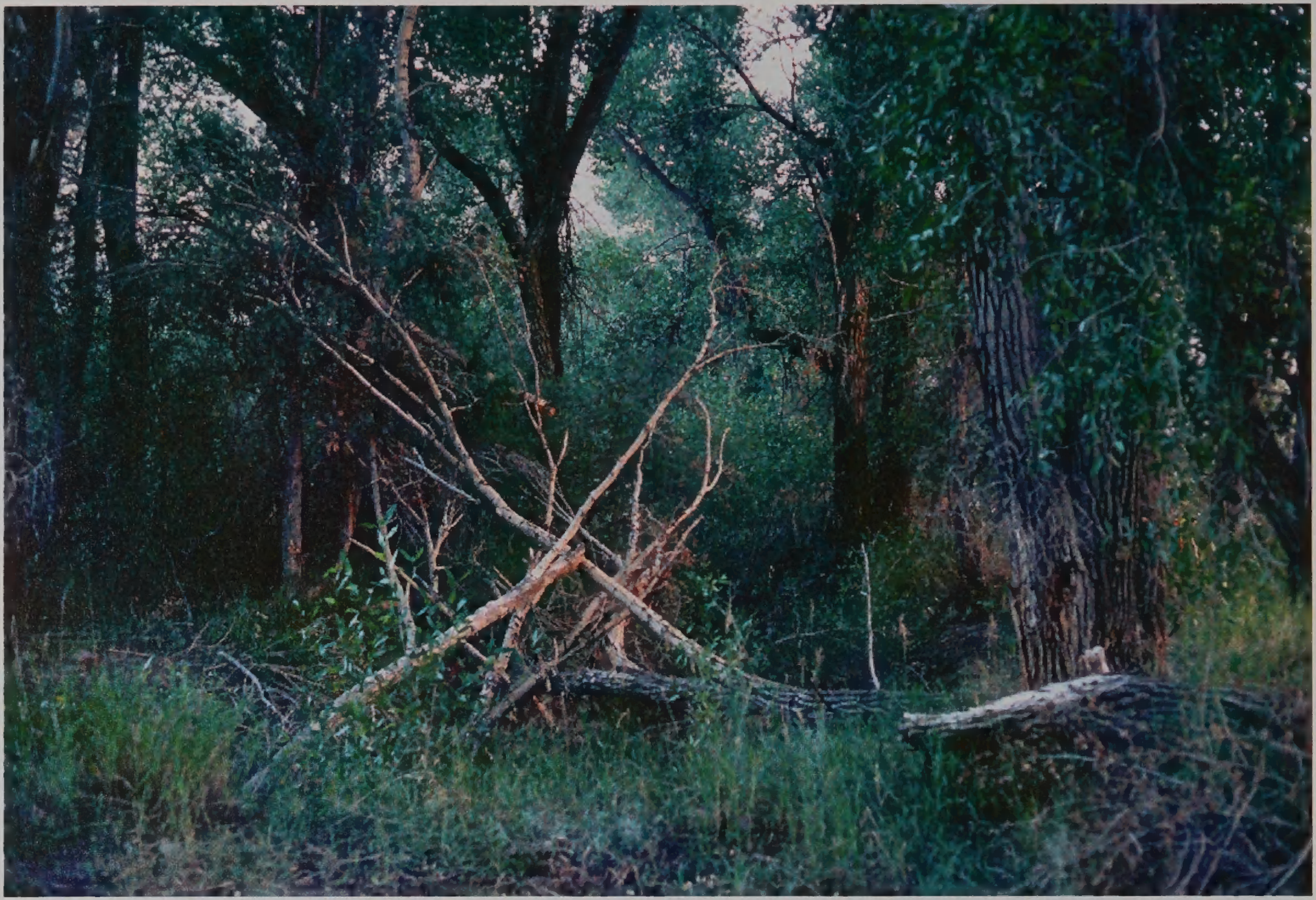
This stand of the ***Acer negundo/Cornus stolonifera*** **(Box-Elder/Red-Osier Dogwood) Habitat Type** is found along the lower elevations of Wolverine Creek. Stands this habitat type are typically heavily utilized by livestock.



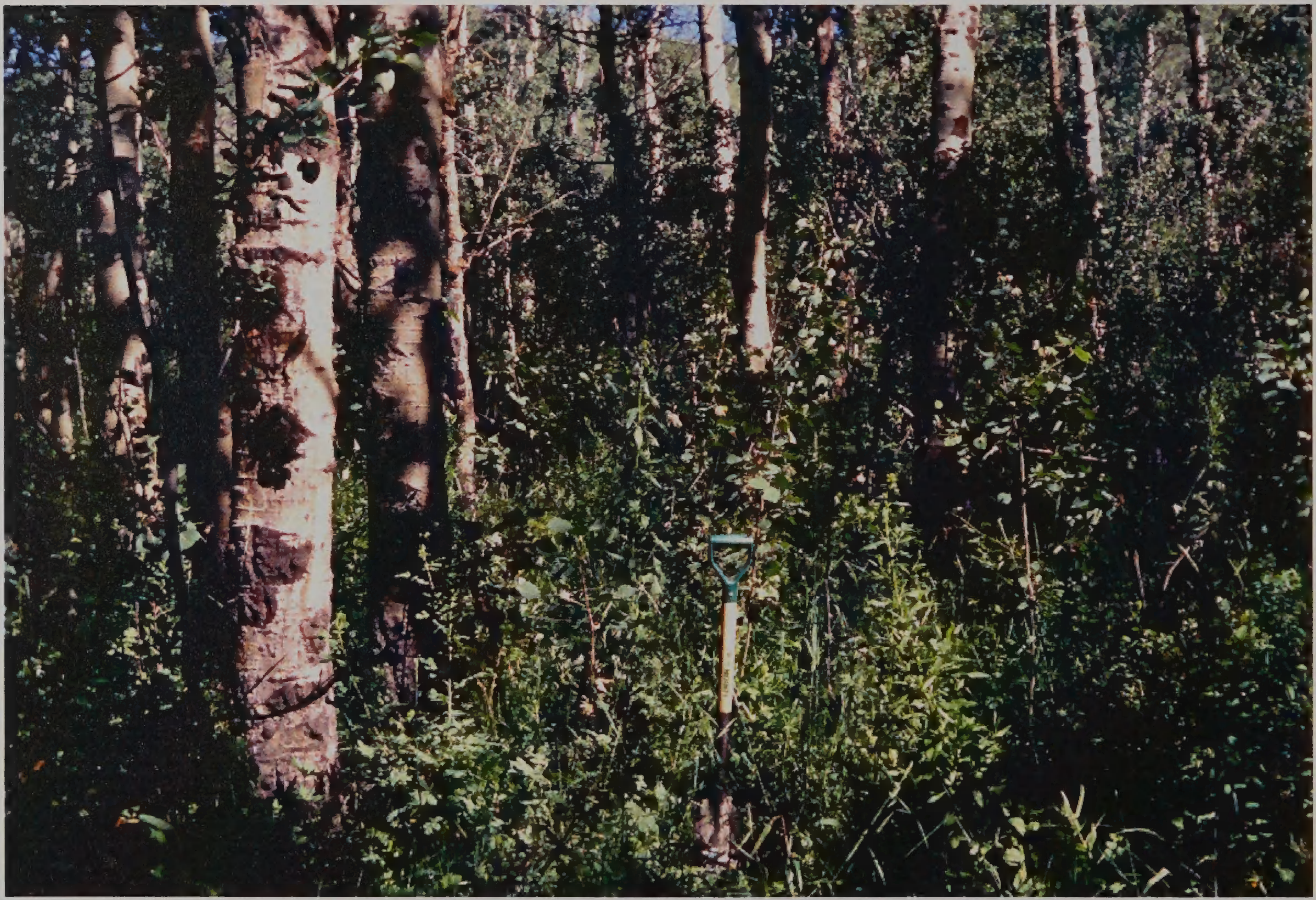
This stand of the ***Elaeagnus angustifolia*** **(Russian Olive) Community Type** is found near McTucker Creek at around 1,348 m (4,422 ft) in elevation. Some stands of this community type can be quite dense and occupy extensive acreages.

This stand of the ***Populus angustifolia/Cornus stolonifera* (Narrowleaf Cottonwood/Red-Osier Dogwood) Community Type** is found along the South Fork of the Snake River at around 1,585 m (5,200 ft) in elevation. The photo shows the outer edge of the stand.

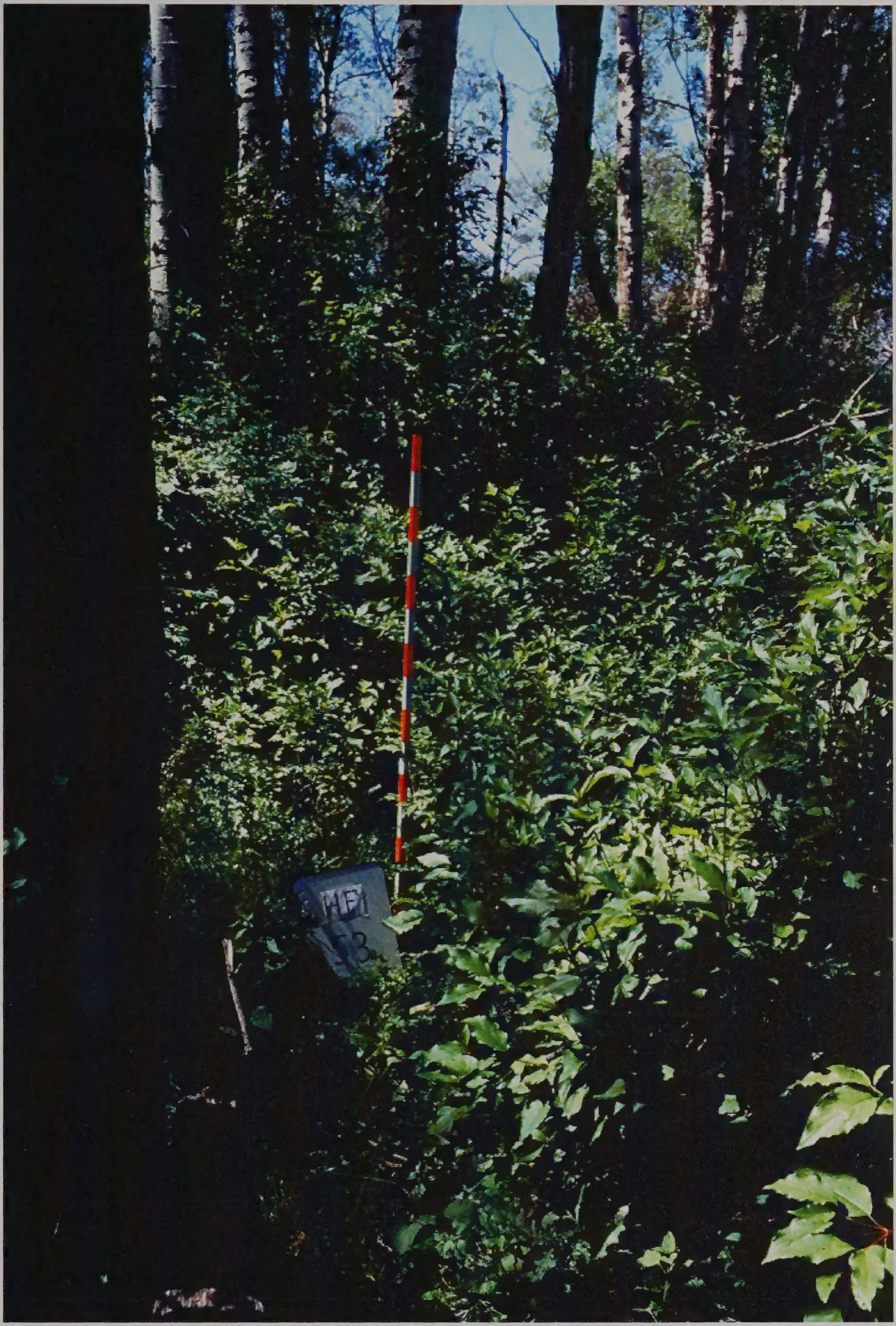
This stand of the ***Populus angustifolia*/Herbaceous (Narrowleaf Cottonwood/Herbaceous) Community Type** is found along the South Fork of the Snake River. Stands of this type typically resemble a city park with little to no shrubs present.



This stand of the ***Populus angustifolia/Symphoricarpos occidentalis* (Narrowleaf Cottonwood/Western Snowberry) Community Type** is found along Badger Creek at around 1,710 m (5,610 ft) in elevation. Grazing increaser shrubs tend to dominate the understory.



This stand of the ***Populus tremuloides/Osmorhiza occidentalis* (Quaking Aspen/Western Sweet-Cicely) Habitat Type** is found near the Sand Creek WMA at around 1,710 m (5,610 ft) in elevation. Stands of this habitat type typically have large amounts of grasses and forbs present.



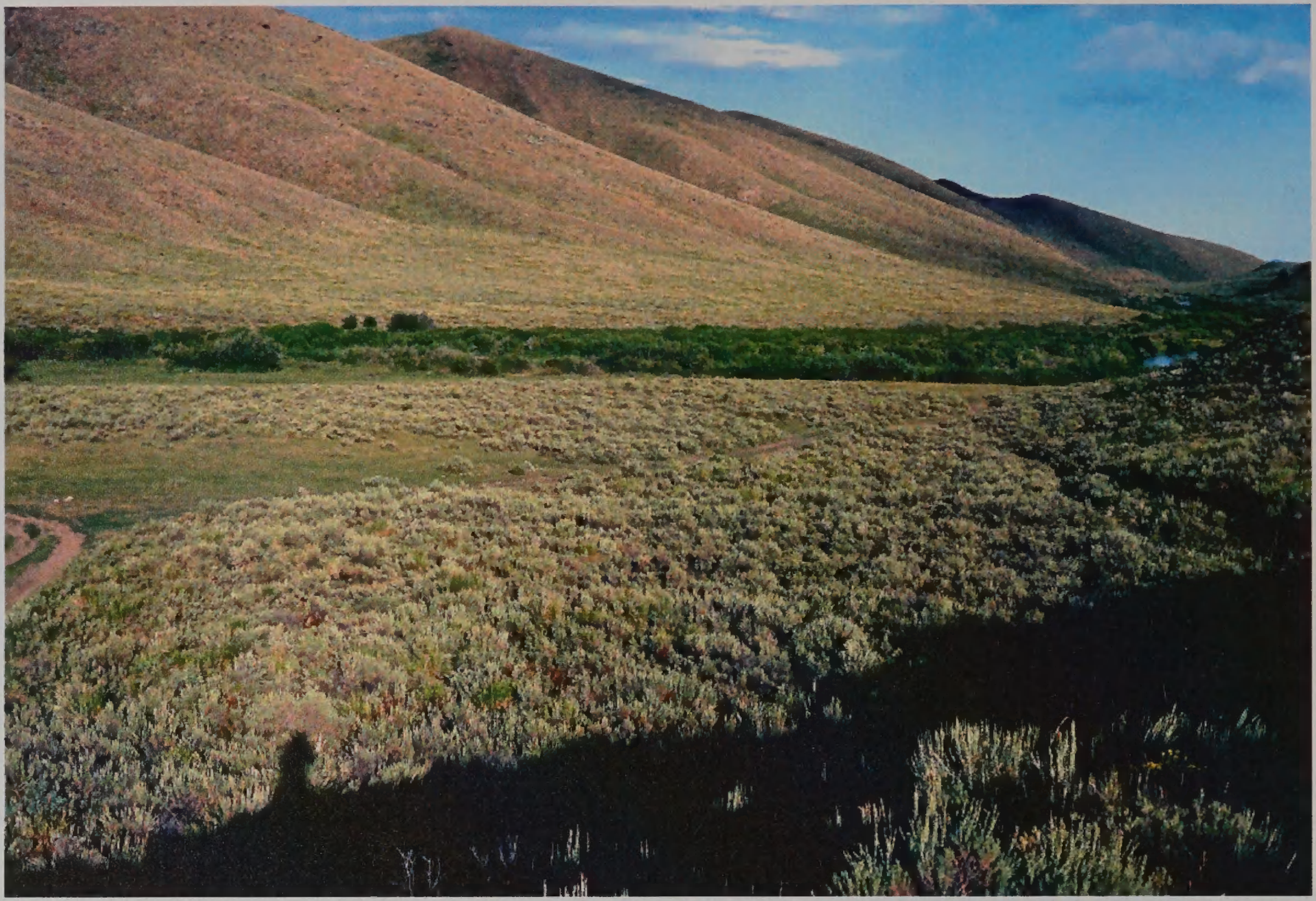
This stand of the ***Populus tremuloides/Cornus stolonifera*** **(Quaking Aspen/Red-Osier Dogwood) Habitat Type** is found along the Henry's Fork at around 1,484 m (4,870 ft) in elevation. The understory is dominated by a luxuriant layer of *Cornus stolonifera* (red-osier dogwood).

This stand of the ***Populus trichocarpa/Cornus stolonifera*** **(Black Cottonwood/Red-Osier Dogwood) Community Type** is found along Henry's Fork at around 1,585 m (5,200 ft) in elevation. *Cornus stolonifera* (red-osier dogwood) in this stand has a canopy cover of 70 percent.

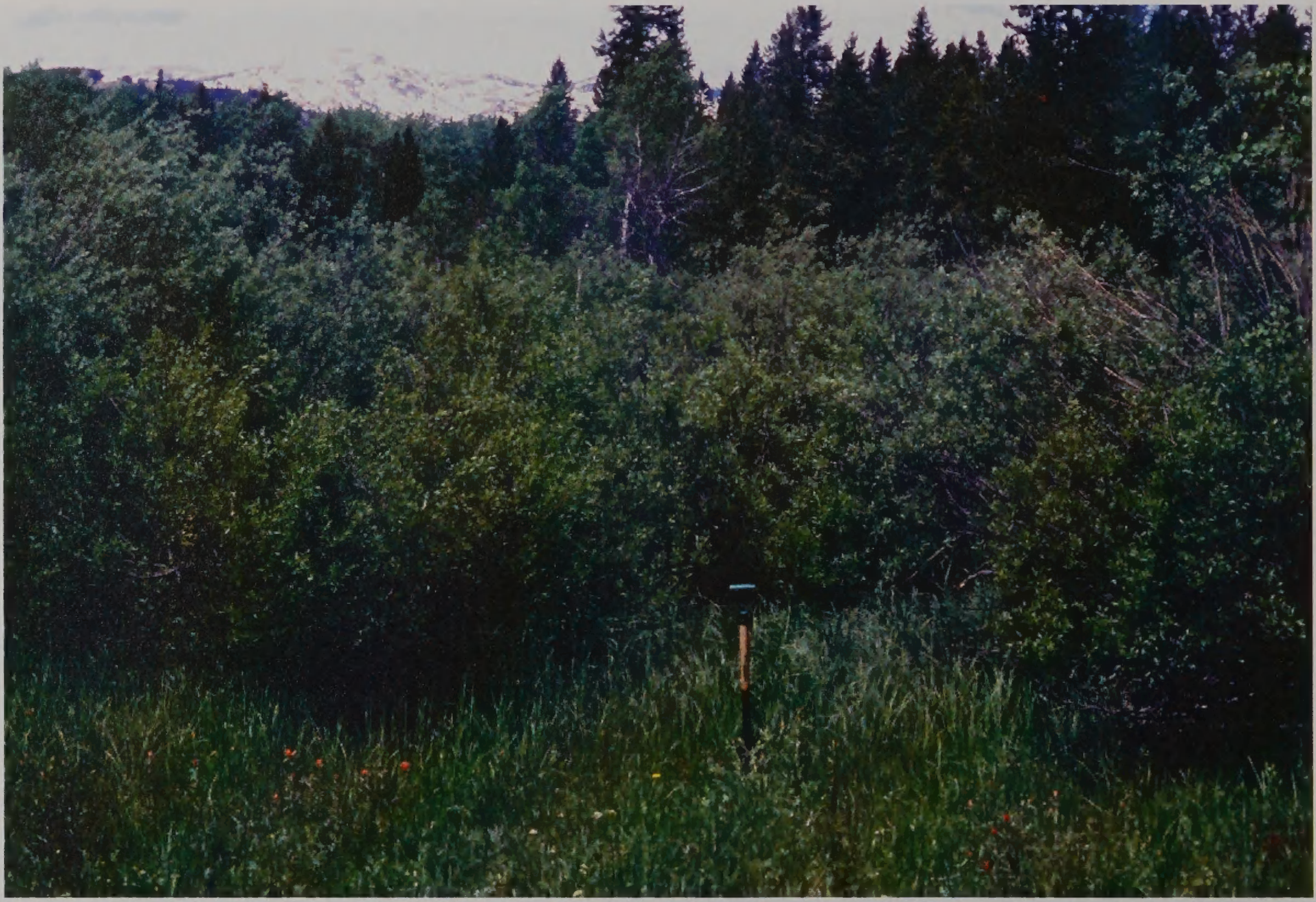
This stand of the ***Salix bebbiana*** **(Bebb Willow) Community Type** is found along Edie Creek. The under story is dominated by *Carex nebrascensis* (Nebraska sedge).

This stand of the ***Salix drummondiana/Calamagrostis canadensis* (Drummond Willow/Bluejoint Reedgrass) Habitat Type** is found along Canyon Creek at around 2,134 m (7,000 ft) in elevation.

This stand of the ***Salix exigua* (Sandbar Willow) Community Type** is found along a tributary to Sand Creek at round 1,609 m (5,280 ft) in elevation. Stands of this type are typically dominated by an understory of *Agrostis stolonifera* (redtop).



This stand of the ***Salix geyeriana*** **(Geyer Willow) Community Type** is found along the Blackfoot River at around 1,811 m (5,940 ft) in elevation. This stand represents a grazing-induced disturbance community type.



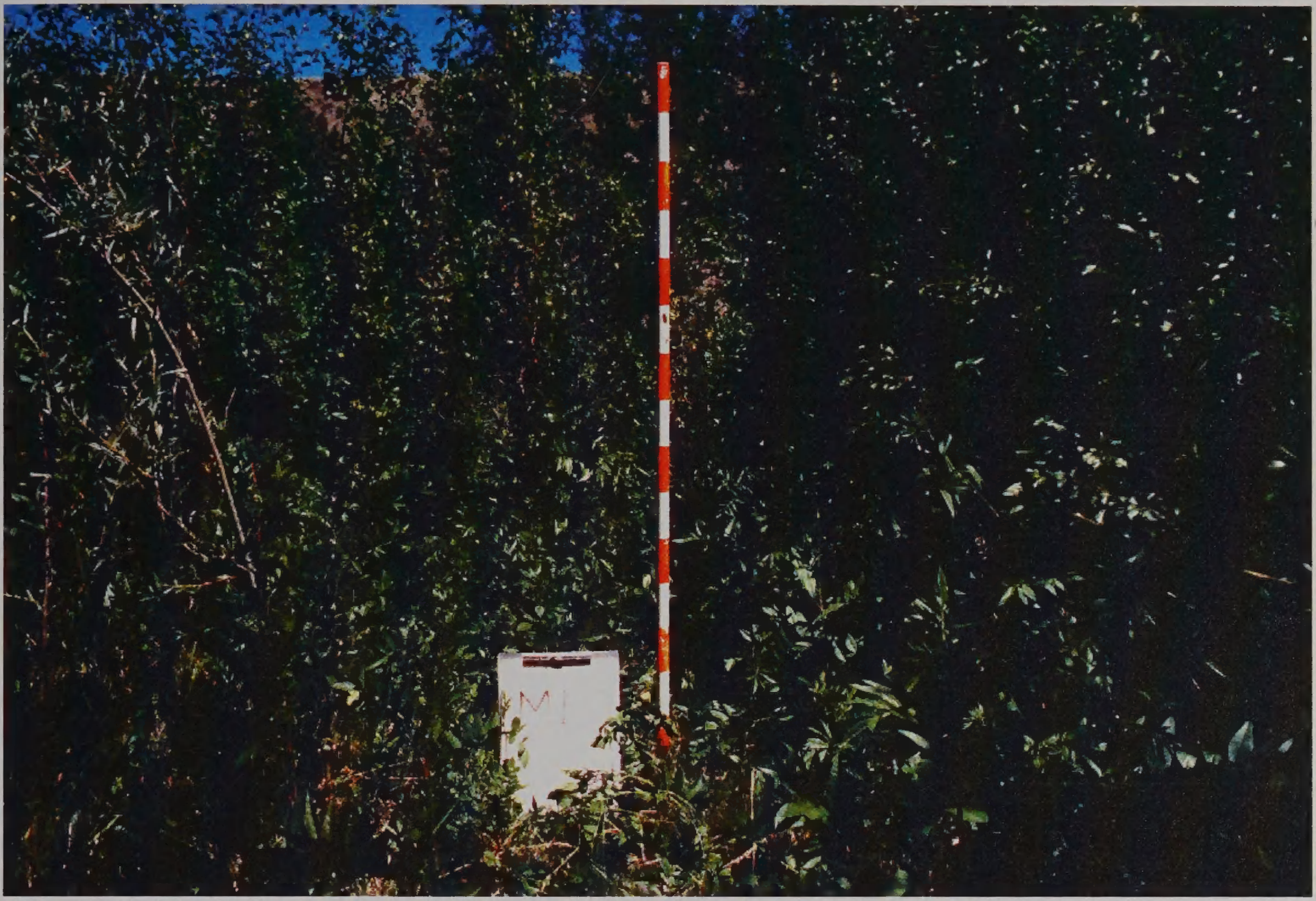
This stand of the ***Salix geyeriana /Carex rostrata*** **(Geyer Willow/Beaked Sedge) Habitat Type** is located along Schneider Creek at around 1,951 m (6,400 ft) in elevation. *Salix boothii* (Booth willow) is also found in limited amounts.

This stand of the ***Salix lasiandra* (Pacific Willow) Community Type** is found on a tributary to Sand Creek. The grass layer is dominated by *Agropyron repens* (quackgrass).

This stand of the ***Salix lutea* (Yellow Willow) Community Type** is found along Tex Creek at around 1,609 m (5,280 ft) in elevation. This disturbed stand currently has large amounts of *Betula occidentalis* (water birch) present.

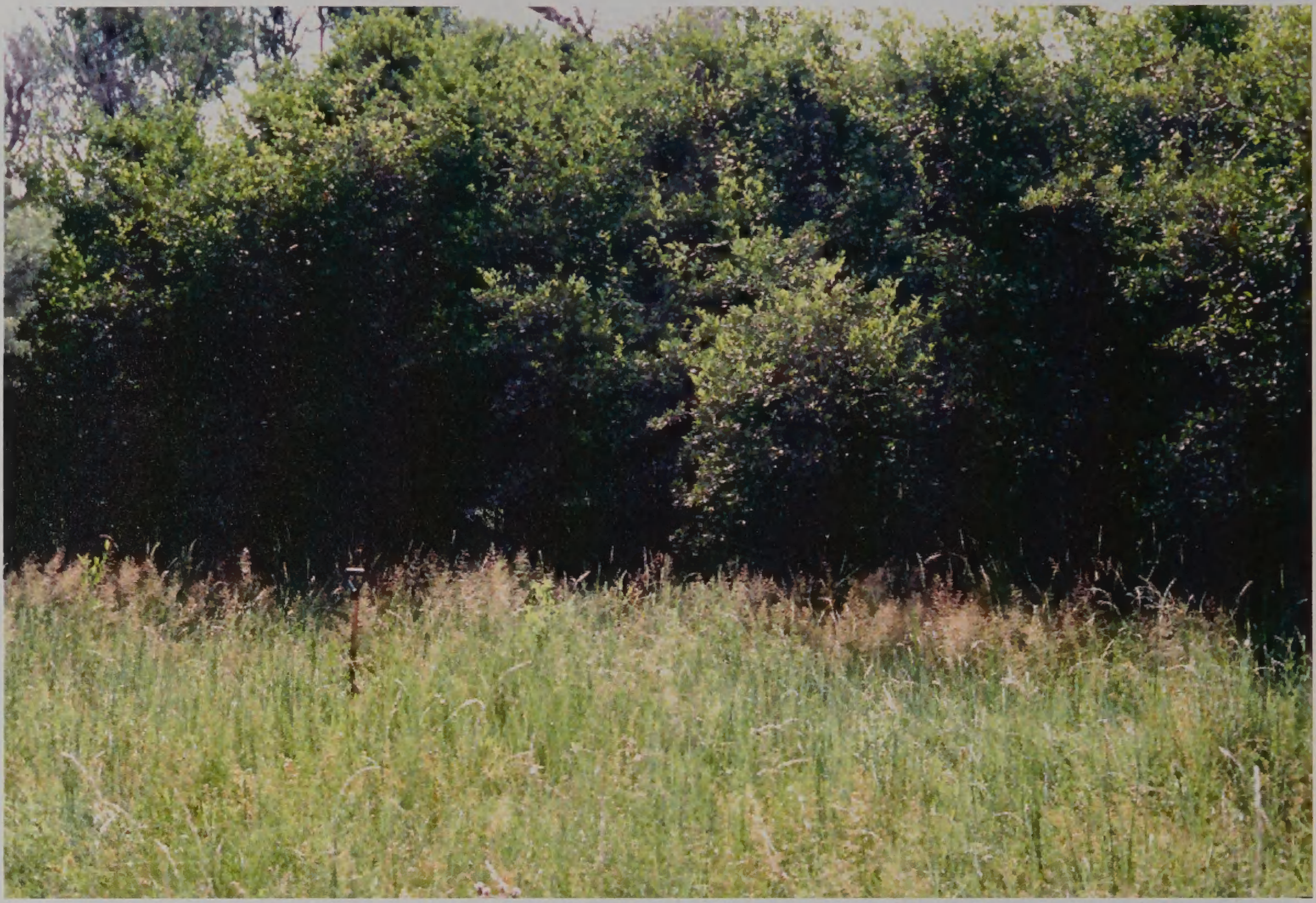
This stand of the ***Acer grandidentatum* (Bigtooth Maple) Community Type** is found along Blackrock Canyon. Dense stands of this type have limited understory species associated with them.

This stand of the ***Alnus incana* (Mountain Alder) Community Type** is found along Stodard Gulch. Large amounts of *Ribes lacustre* (swamp currant) are associated with this stand.

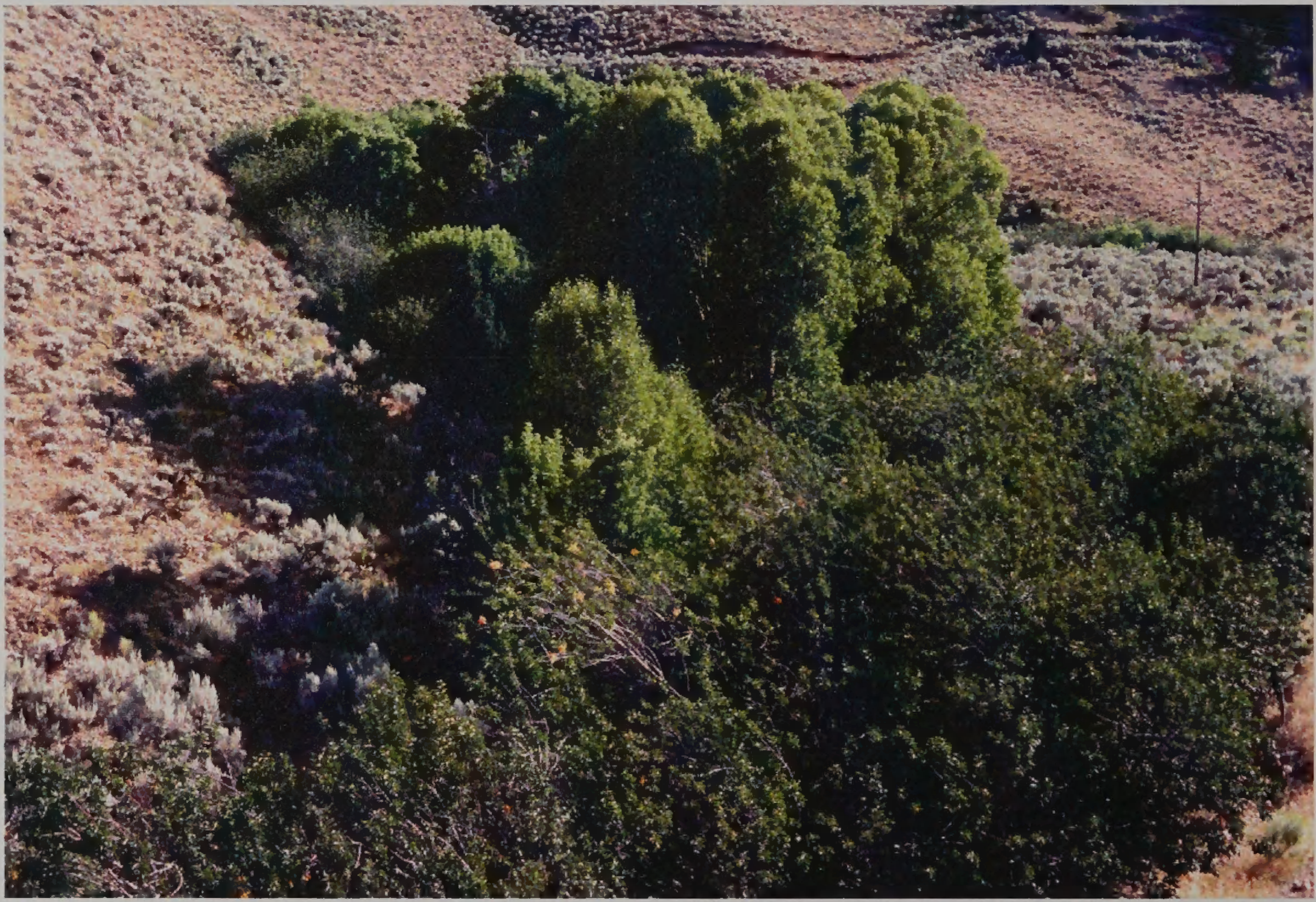


This stand of the ***Betula occidentalis* (Water Birch) Community Type** is found along Medicine Lodge Creek. *Agrostis stolonifera* (redtop) and *Poa pratensis* (Kentucky bluegrass) is the dominate understory species in this stand.

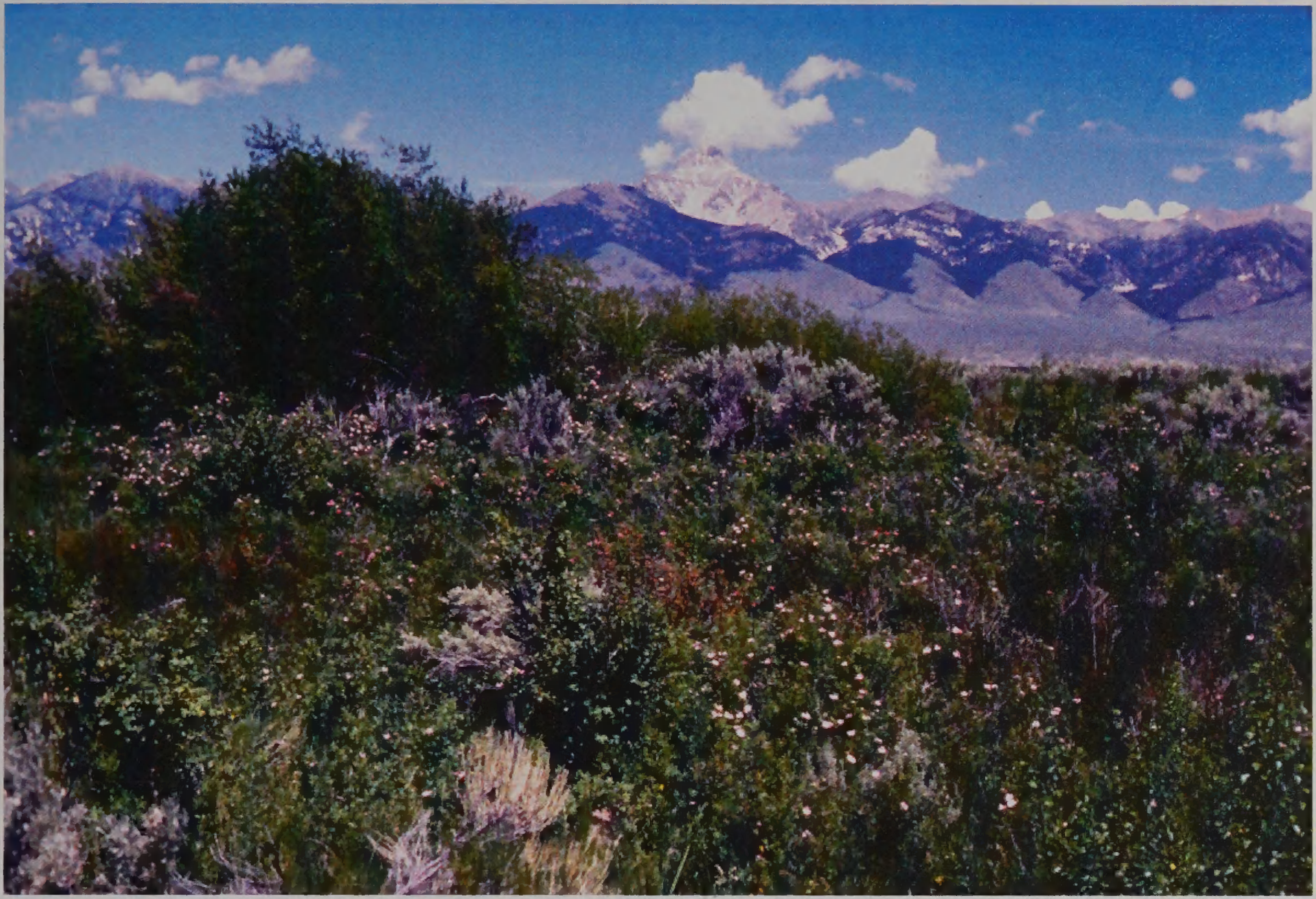
This stand of the ***Cornus stolonifera* (Red-Osier Dogwood) Community Type** is found along Middle Creek at around 1,707 m (5,600 ft) in elevation. Dense stands of this type have a very depauperate understory associated with them.



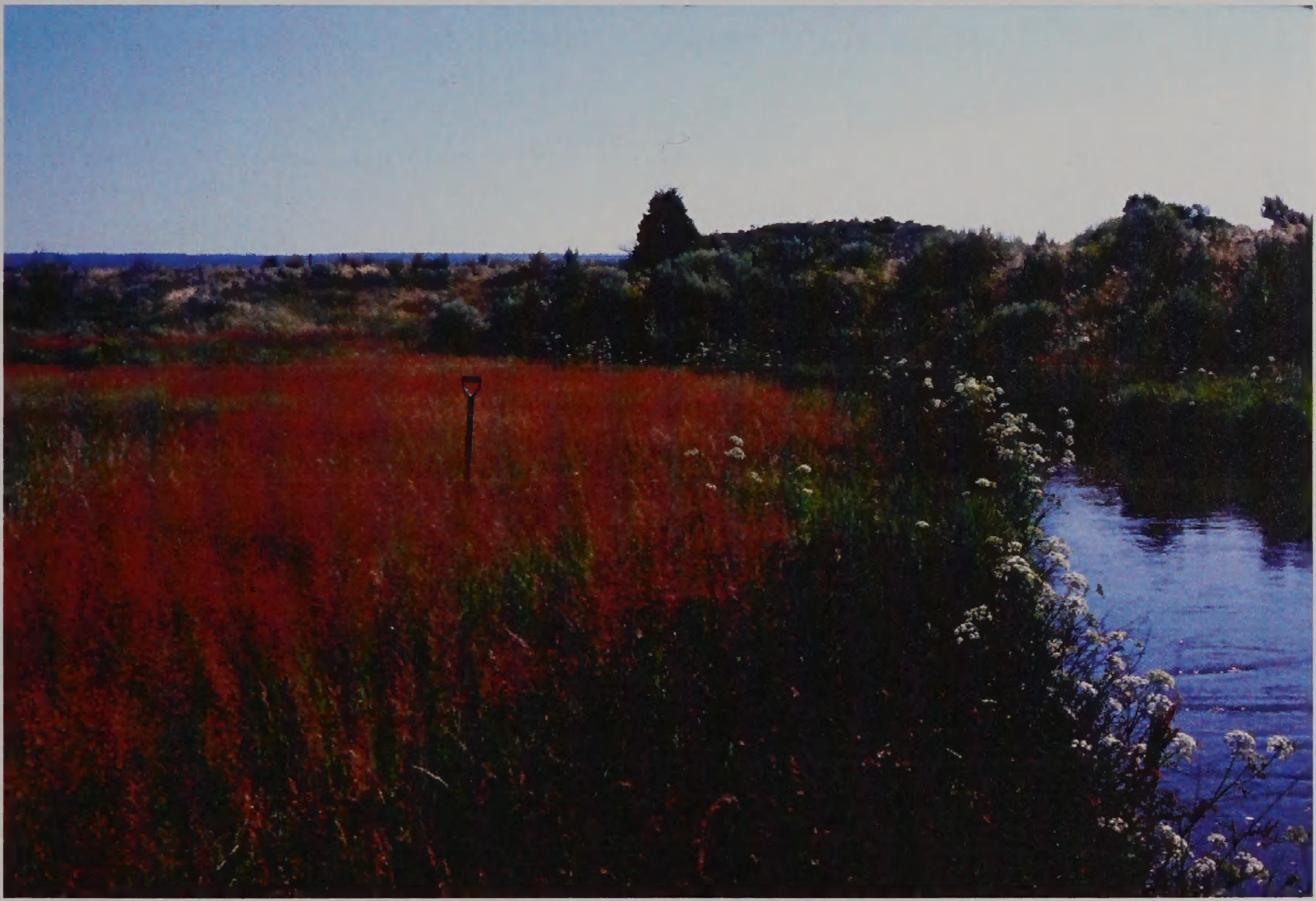
This stand of the ***Crataegus douglasii* (Black Hawthorn) Community Type** is found along the South Fork of the Snake River at around 1,348 m (4,422 ft) in elevation. This community type represents a grazing-induced disturbance community type.



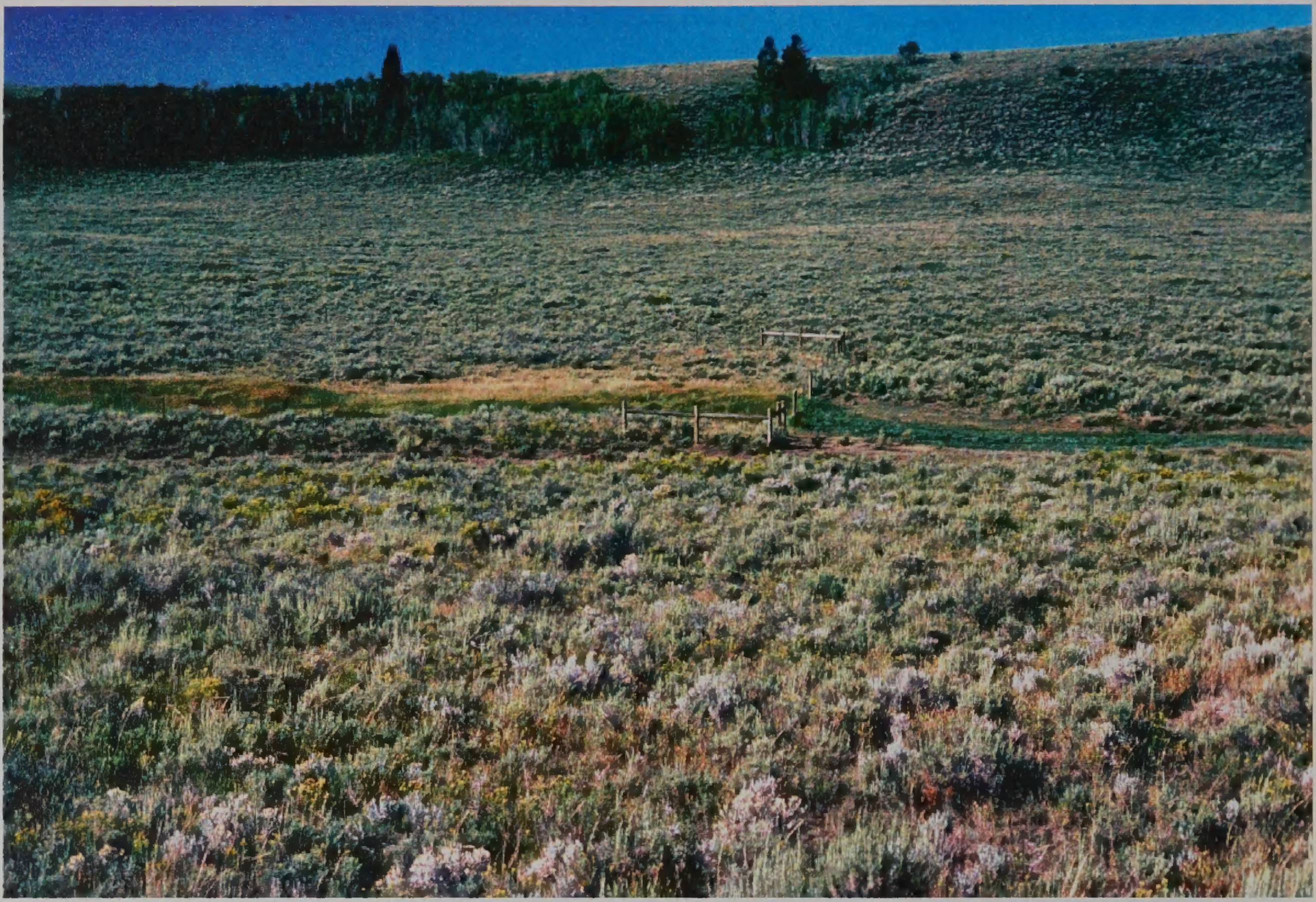
This stand of the ***Prunus virginiana* (Common Chokecherry) Community Type** (in the foreground) is found along Indian Creek at around 1,961 m (6,435 ft) in elevation. The shrub will exceed 4 m (12 ft) in height.



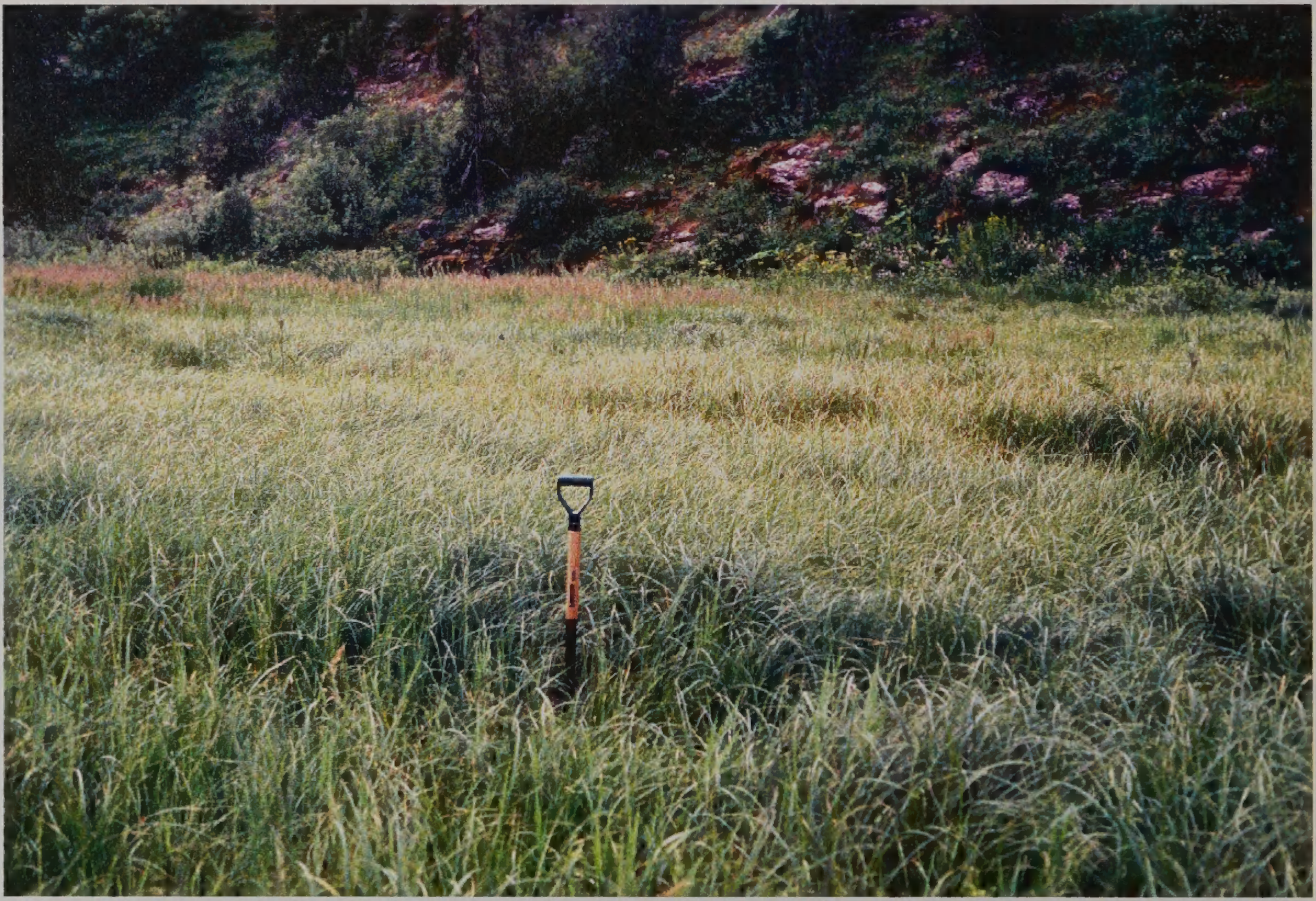
This stand of the ***Rosa woodsii* (Woods Rose) Community Type** is found along Wet Creek at around 1,829 m (6,000 ft) in elevation. This community type represents a grazing-induced disturbance type.



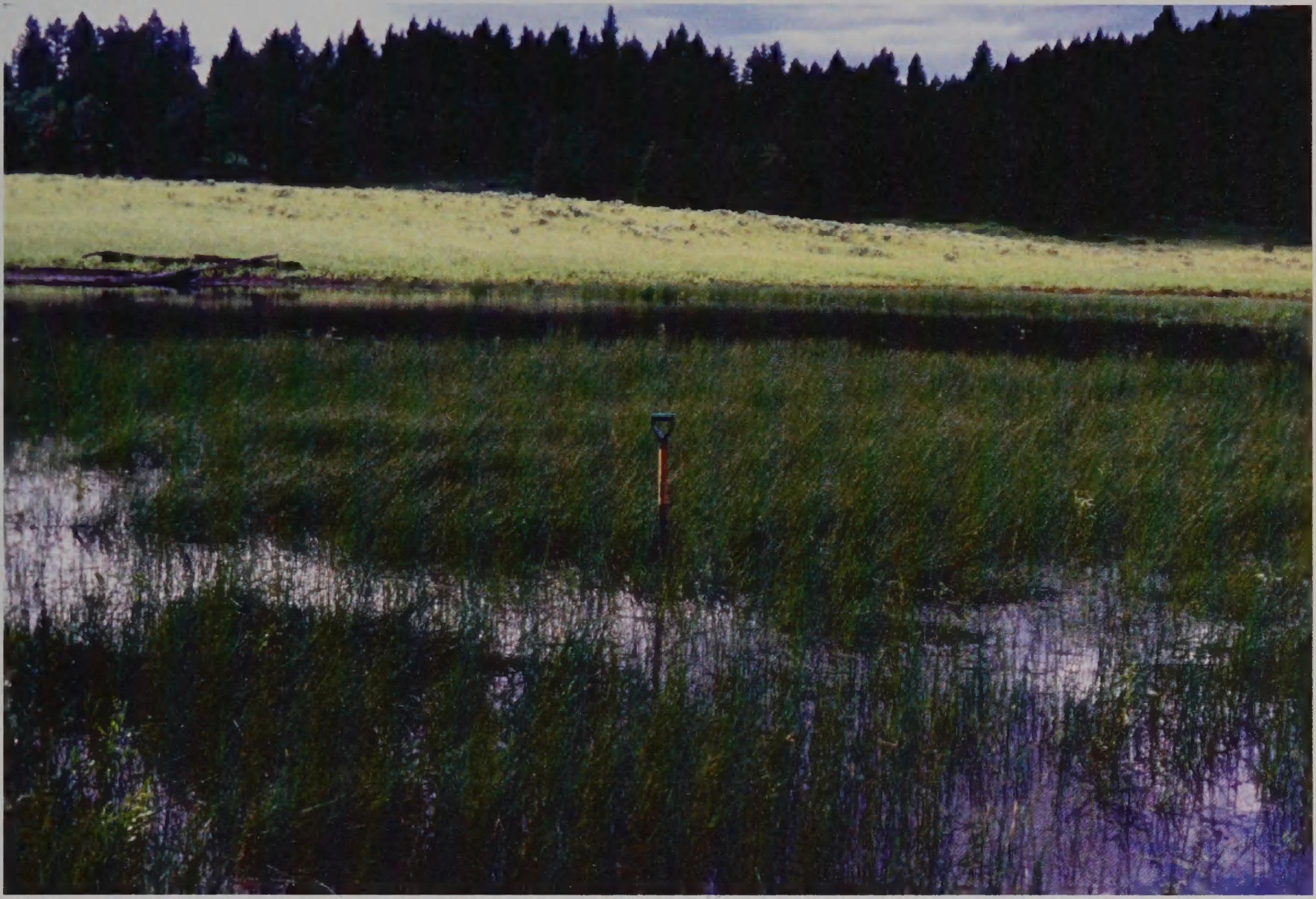
This stand of the ***Agrostis stolonifera* (Redtop) Community Type** is found along Sand Creek. Stands of this type are dominated by *Agrostis stolonifera* (redtop) with limited additional species present.



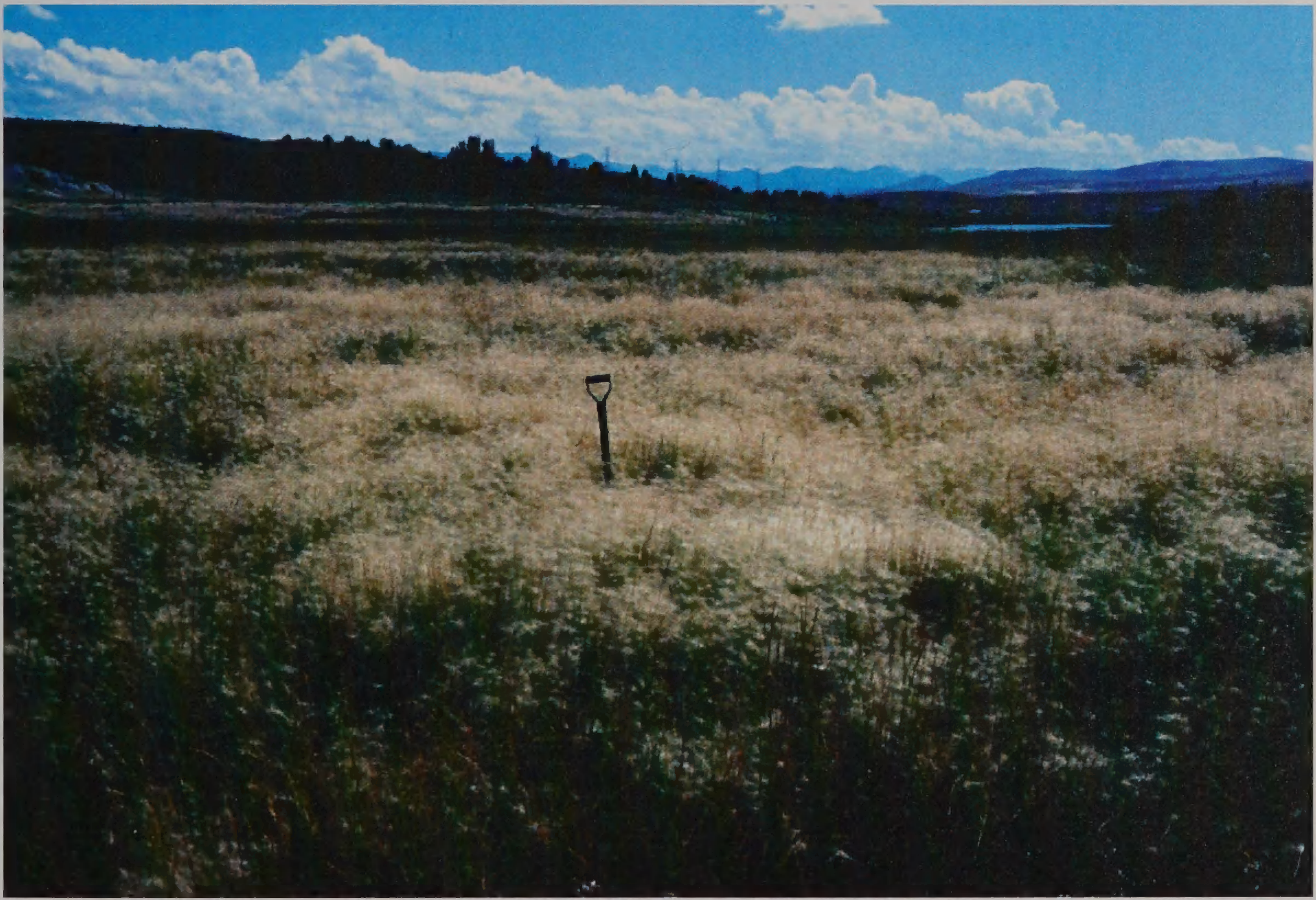
This stand of the ***Carex nebrascensis* (Nebraska Sedge) Community Type** is found along Negro Creek at around 1,836 m (6,023 ft) in elevation. This is a grazing-induced community type and is found to the right of the fence.



This stand of the ***Carex rostrata* (Beaked Sedge) Habitat Type** is found along Putney Canyon Creek at around 1,660 m (5,445 ft) in elevation. The stand represents a late seral to near climax stand of this habitat type.



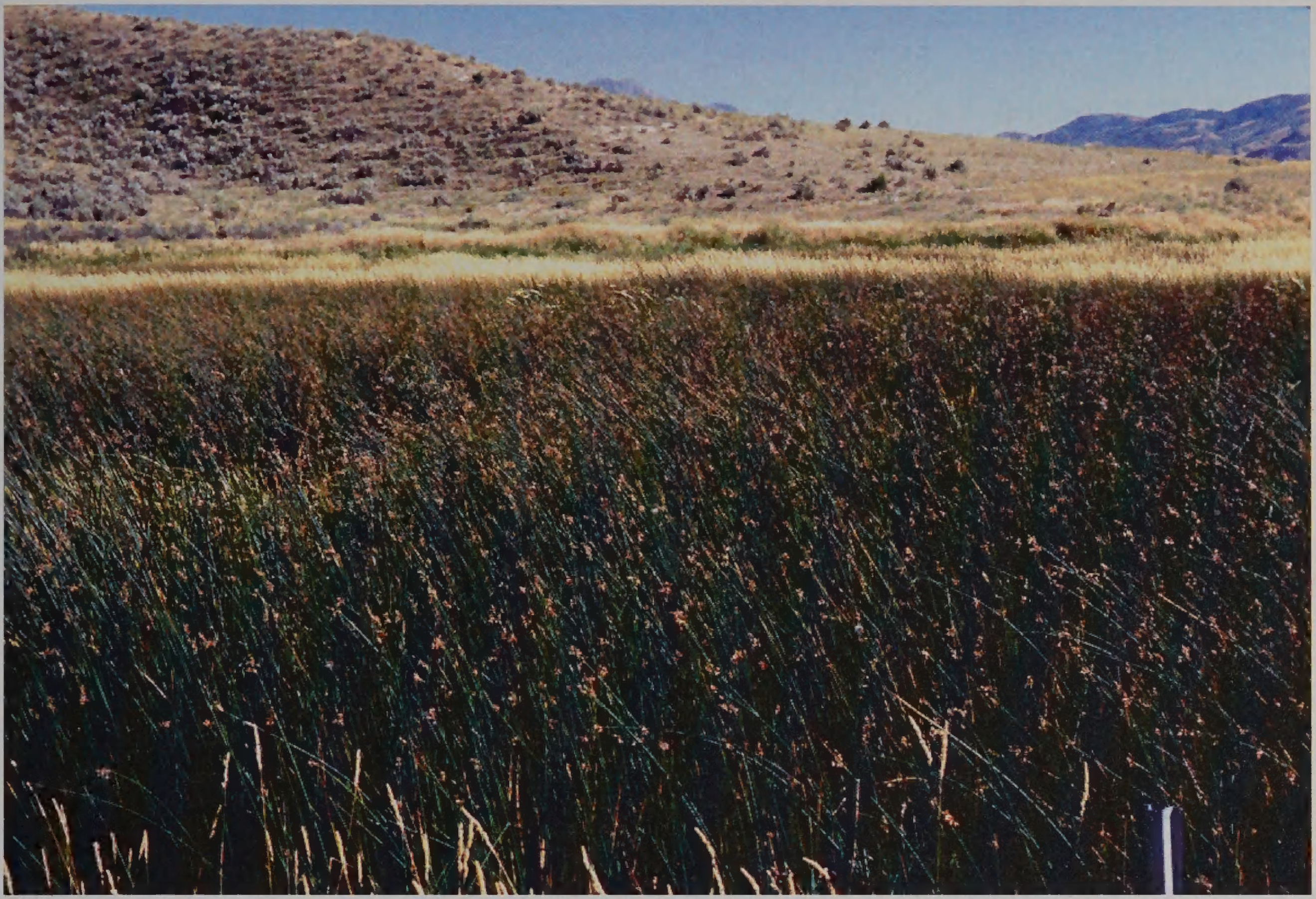
This stand of the ***Eleocharis palustris* (Common Spikesedge) Habitat Type** is found in a slough near Ching Creek at around 2,012 m (6,600 ft) in elevation. Relatively undisturbed stands of this type are monotypic in nature.



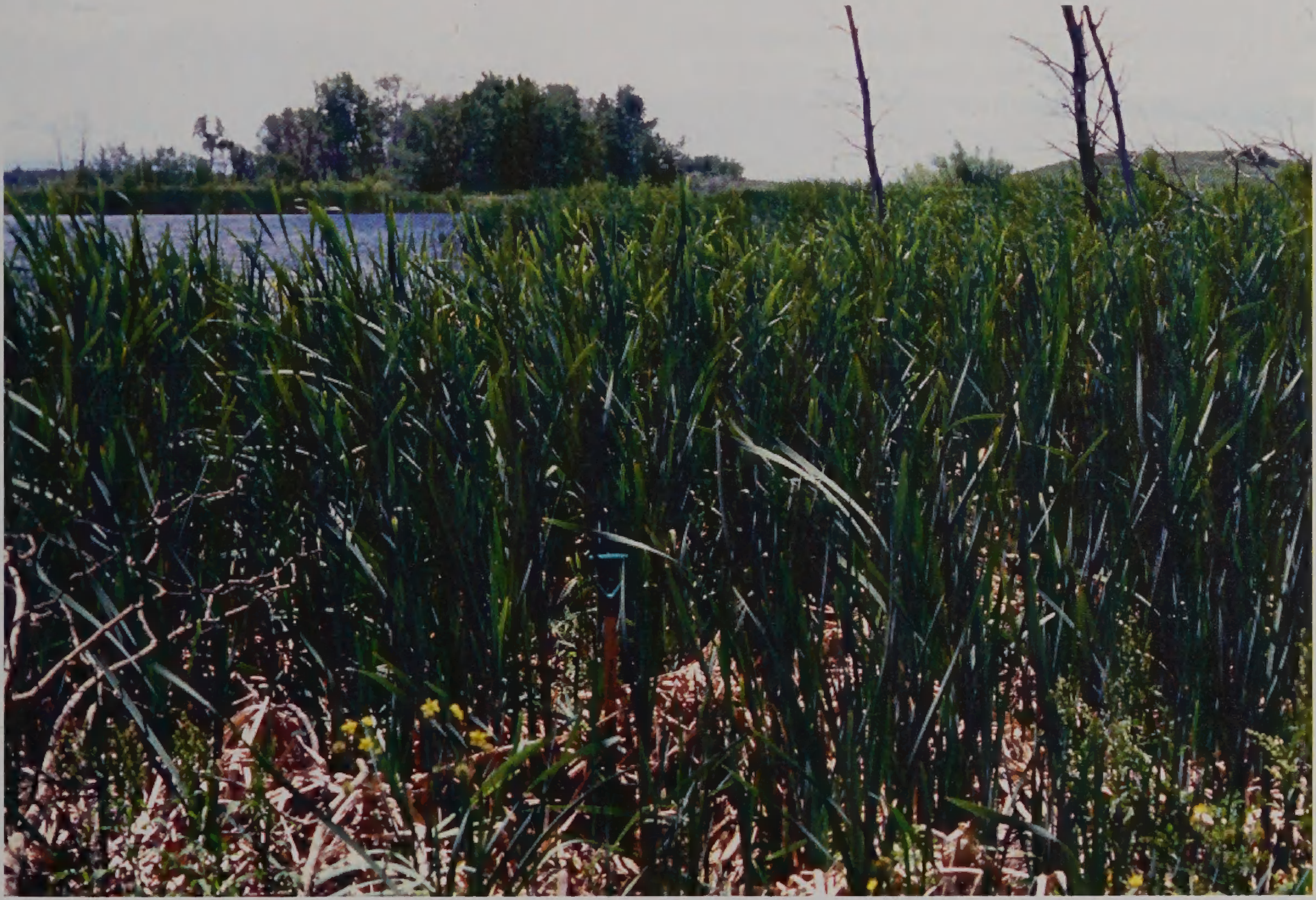
This stand of the ***Hordeum jubatum* (Foxtail Barley) Community Type** is found near Bear River at around 1,609 m (5,280 ft) in elevation. This community type is a disturbance type.

This stand of the ***Phalaris arundinacea* (Reed Canarygrass) Habitat Type** is found along the South Fork of the Snake River at around 1,585 m (5,200 ft) in elevation. Stands of this type are dominated by *Phalaris arundinacea* (reed canarygrass) and little else.

This stand of the ***Poa pratensis* (Kentucky Bluegrass) Community Type** is found along Henry's Fork at around 1,463 m (4,800 ft) in elevation. This community type is a grazing-induced disturbance community type.



This stand of the ***Scirpus acutus* (Hardstem Bulrush) Habitat Type** is located along Marsh Creek at around 1,408 m (4,620 ft) in elevation. The stand represents a late seral to climax stand of this habitat type.



This stand of the ***Typha latifolia* (Common Cattail) Habitat Type** is found along Sand Creek WMA at around 1,760 m (5,775 ft) in elevation. The stand represents a late seral to climax stand.

This stand of the ***Polygonum amphibium*** **(Water Smartweed) Community Type** is located along Oxford Reservoir at around 1,509 m (4,950 ft) in elevation. Stands of this type are dominated by only one species, *Polygonum amphibium* (water smartweed).

This stand of the ***Wyethia amplexicaulis*** **(Northern Mule's-ears)** is found near Willow Creek at around 1,932 m (6,340 ft).

GLOSSARY

Abandoned Meander Channel. A former stream channel that was cut off from the rest of the river and typically lacks year-long standing water.

Aerobic. Condition in which molecular oxygen is present in the environment.

Albic Soil Horizon. A mineral soil horizon of virtually clean sand and silt particles; clays and free iron oxides have been removed most commonly by leaching, leaving the soil horizon a whitish appearance.

Alfisols. A soil order composed of soils having significantly more clay in the B horizon than in the A horizon and high base status.

Alkaline. Water or soil with a pH greater than 7.4.

Alluvial Soil. Sediments (clay, silt, sand, gravel, cobbles, and boulders) deposited by running water, ordinarily occurring on floodplains and at the base of ridges and slopes.

Alluvial Terrace. Deposits of alluvial soil that mark former floodplains. Typically, a floodplain may have several sets of alluvial terraces at different elevations and of different ages (the higher the elevation, the older the age).

Alluvium. An accumulation of sediments deposited by streams or rivers.

Anaerobic. Condition in which molecular oxygen is absent from the environment. This commonly occurs in wetlands where soils experience prolonged saturation by water.

Andisols. Are dark mineral soils developed in volcanic ash, pumice, cinders, other volcanic ejecta, or volcaniclastic materials.

Aqualfs. Soils with aquic conditions and having clay accumulating in the B horizon: wet Alfisols.

Aquatic Bed (Cowardin and others 1979). A *class* of wetland and deepwater habitat dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.

Aquents. Soils with aquic conditions and lacking distinct soil horizons in the subsoil: wet Entisols.

Aquepts. Soils with aquic conditions and showing little soil development in the B horizon: wet Inceptisols.

Aquic Conditions. These soils experience continuous or periodic saturation and reduction. The presence of these conditions is indicated by redoximorphic features.

Aquic Moisture Regime (obsolete). A moisture condition associated with a seasonal reducing environment that is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe, as in soils in Aquic suborders and Aquic subgroups.

Argillic Soil Horizon. A soil horizon that shows evidence of movement or accumulation of silicate clays, and possesses a higher clay content than an overlying horizon.

Available Water Capacity. The ability of a soil to hold water in a form available to plants, expressed in inches of water per inch of soil depth. Classes are: 1) Low = 0 - 0.12, 2) Moderate = 0.13 - 0.17, and 3) High = > 0.17

Average Canopy Cover. Refers to the "average" canopy cover of a particular species for the stands that it was recorded. For example, the number of stands sampled for a habitat type or community type may be 20. However, a particular species may only occur in 7 of the 20 stands. The average canopy cover therefore represents the "average" canopy cover of that particular species in the 7 stands.

Backwater Area. Seasonal or permanent water bodies found in the lowest parts of floodplains, typically circular or oval in shape.

Bars (Alluvial). Sediment accumulations along waterways deposited by moving water. Examples include: 1) ***point bars*** — bars that are formed on the inside of a meander channel, 2) ***side bars*** — bars that are formed along the edges of relatively straight sections of a river, 3) ***mid-channel bars*** — these are found within the channel and generally become more noticeable during low flow periods, and 4) ***delta bars*** — formed immediately downstream of the confluences of a tributary and the main river.

Beaver Dams. Dams built by beavers that span the stream channel. In general, water is still flowing through the riparian system.

Bog (Mitsch and Gosselink 1986). A sphagnum moss-dominated community whose only water source is rainwater. They are extremely low in nutrients, form acidic peats, and are a northern phenomenon generally associated with low temperatures and short growing seasons.

Browse. Shrubby and woody forage consumed by wildlife.

Calcic Soil Horizon. A subsurface soil horizon with an accumulation of carbonates.

Cambic Soil Horizon. An altered soil horizon that does not have the dark color, organic matter content, or structure of a histic, mollic, or umbric epipedon. Cambic horizons possess the following characteristics: 1) texture is very fine sand, loamy very fine sand, or finer, 2) soil structure or absence of rock structure in at least 1/2 of the horizon (by volume), and 3) the alteration of soil color by the loss of carbonates or aquic conditions.

Canopy Coverage. The percentage of ground covered by the gross outline of an individual plant's foliage; or collectively covered by all individuals of a species within a stand or a sample plot.

Capillary Fringe. A zone immediately above the water table in which water is drawn upward from the water table by capillary action.

Carr. Wetland on organic soil with greater than 25 percent cover of shrubs. Typically, carrs are dominated by willows (*Salix* species).

Climax Community. Refers to the final or steady state plant community which is self-perpetuating and in dynamic equilibrium with its environment.

Colluvium. A deposit of unconsolidated geologic materials and soil accumulated at the base of slopes as a result of gravity.

Community (Plant Community). An assembly of plants living together, reflecting no particular ecological status.

Community Type. An aggregation of all plant communities distinguished by floristic and structural similarities in both overstory and undergrowth layers. A unit of vegetation within a classification. ***For the purposes of this document, a community type represents seral vegetation, and is never considered to be climax.***

Constancy. The percentage of sampled stands in which a species occurs.

Disclimax. Where recurring disturbances, such as grazing (e.g., zootic disclimax) or periodic burning (e.g., fire disclimax), exert the predominant influence in maintaining the structure and composition of the steady-state vegetation. Disclimaxes, such as the zootic climax or fire climax, are not the basis for recognizing habitat types.

Diversity. The kind and amount of species in a community per unit area.

Drained. A condition in which ground or surface water has been removed by artificial means.

Dominance Type (Equivalent to Cover Type). An aggregation of all stands (individual plant communities), grouped and named simply by the species with the greatest canopy coverage in the overstory or upper layer. In this classification, canopy cover of dominant species is greater than 25 percent.

Emergent Plant. A rooted herbaceous plant species that has parts extending above a water surface.

Emergent Wetland (Cowardin and others 1979). A *class* of wetland habitat characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens

Entisols. A soil order including soils of slight or recent development; common along rivers and floodplains.

Ephemeral Stream. A stream or stretch of a stream that flows only in direct response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other surface source. Its stream channel is at all times above the water table. These streams do not normally flow for 30 consecutive days.

Epipedon. Diagnostic soil horizons formed at the soil surface (e.g., argillic horizon).

Facultative Species. Plant species that can occur both in wetlands and uplands. There are three subcategories of facultative species: 1) facultative wetland plants, 2) facultative plants, and 3) facultative upland plants.

Facultative Plants (FAC). A plant species that is equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

Facultative Upland Plants (FACU). A plant species that usually occurs in nonwetlands (estimated probability 67-99 percent), but occasionally found in wetlands (estimated probability 1-33 percent).

Facultative Wetland Plants (FACW). A plant species that usually occurs in wetlands (estimated probability 67-99 percent), but occasionally found in nonwetlands.

Fen (Mitsch and Gosselink 1986). A non-acidic peat-forming wetland that receives nutrients form sources other than precipitation, usually through groundwater movement.

Fibric Materials. Plant materials that show very little signs of decomposition. Plant fiber content before rubbing between fingers is at least 3/4 of the soil volume.

Fibrists. Organic soils (peats) in which plant remains show very little decomposition and retain original shape; more than 2/3 of the fibers remain after rubbing the materials between the fingers.

Flooded. A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks and runoff from adjacent or surrounding slopes, or any combination of sources.

Floodplain. An alluvial plain caused by the overbank deposition of alluvial material. Typically appearing as flat expanses of land bordering a stream or river. Most floodplains are accompanied by a series of alluvial terraces of varying levels.

Fluvial. Pertaining to or produced by the action of moving water.

Forb. A herbaceous plant, usually broadleaved, that is not a graminoid.

Forested Wetland (Cowardin and others 1979). A *class* of wetland habitat characterized by woody vegetation that is 6 m (20 ft) tall or taller.

Forested Wetlands. Occur near springs and seeps and in areas with naturally high water tables, such as river floodplains. Two general types of forested wetlands occur in Montana: 1) those dominated by coniferous tree species, and 2) those dominated by deciduous angiosperm tree species.

Frequently Flooded. A class of flood frequency in which flooding is common during most years (more than a 50 percent chance of flooding in any year, or more than 50 times in 100 years).

Gallery Forest. A strip of forest confined to a stream margin or floodplain in an otherwise unforested landscape.

Gleization. A process in saturated or nearly saturated soils which involves the reduction of iron. This process tends to give gray colors (low chroma) to those parts of the soil from which the iron has been reduced or removed and rust colors (high chroma) to those where the iron has oxidized and accumulated.

Gleyed Soil (obsolete). A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under reducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state. See also redox depletions.

Graminoid. Grass or grass-like plant, such as species of the Poaceae (grasses), Cyperaceae (sedges), and Juncaceae (rushes).

Ground Water. Water occupying the interconnected pore spaces in the soil or geologic material below the water table, this water has a positive pressure.

Growing Season. The portion of the year when soil temperatures are above biologic zero (41° F) as defined by *Soil Taxonomy*; the following growing season months are assumed for each of the soil temperature regimes: 1) thermic (February-October), 2) mesic (March-October), 3) frigid (May-September), 4) cryic (June-August), and 5) pergelic (July-August).

Habitat Type. The land area that supports, or has the potential of supporting, the same primary climax vegetation. A habitat type classification is a vegetation based ecological site classification. It is based on the potential of the site to produce a specific plant community (plant association). It has been used to classify grasslands, shrublands, woodlands, and forests throughout western United States.

Herbaceous. Nonwoody vegetation, such as graminoids and forbs.

Histic Epipedon. A 20 to 40 cm (8 to 16 in) soil layer at or near the surface that is saturated for 30 consecutive days or more during the growing season in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent of organic matter when 60 percent or more clay is present. Generally a thin horizon of peat or muck is present if the soil has not been plowed.

Histosols. A soil order composed of organic soils (peats and mucks) with generally greater than 50 percent organic matter in the upper 80 cm (32 in), or that are of any thickness if overlying rock.

Horizon. A distinct layer of soil, more or less parallel with soil surface, having similar properties such as color, texture, and permeability; the soil profile is subdivided into the following major horizons: 1) ***A horizon*** — a surface horizon characterized by an accumulation of organic material, 2) ***E horizon*** — most commonly a surface horizon, characterized by leaching of organic material, iron, and clay, 3) ***B horizon*** — a subsurface horizon characterized by relative accumulation of organic matter, iron, clay, or aluminum, 4) ***C horizon*** — undisturbed, unaltered parent material.

Hydric Soil (USDA SCS 1990). A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile. Hydric soil indicators are Histosol, histic epipedon, sulfidic odor, aquic moisture regime, reducing conditions, gleyed or low-chroma colors, concretions, high organic content in surface layer in sandy soils, organic streaking in sandy soils, listed on local Hydric Soils List, and listed on National Hydric Soils List (Environmental Laboratory 1987)

Hydrology. The science dealing with the properties, distribution, and circulation of water.

Hydrophyte. Any macrophytic plant that grows in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content; plants typically found in wetland and other aquatic habitats.

Hydrophytic Vegetation. Plant life growing in water or on a substrate that is at least potentially deficient in oxygen as a result of excessive water content.

Inceptisols. A soil order composed of soils of intermediate development; morphological characteristics are generally too weak to meet requirements of other soil orders.

Incidental Type. Refers to a habitat type or community type that rarely occurs or occupies only a small area of a wetland zone.

Intermittent Stream. A stream or reach of stream which flows only at certain times of the year when it receives water from springs or from some surface source (e.g., melting snow). They are usually divided with respect to the source of their water into spring-fed or surface-fed intermittent streams. These streams generally flow continuously during periods of at least one month or more during the year.

Inundation. A condition in which water temporarily or permanently covers a land surface.

Irrigation Canal. Included all types of canals associated with irrigation systems.

Lacustrine System (Cowardin and others 1979). Any wetland or deepwater habitat with the following characteristics: 1) situated in a topographic depression or dammed river channel, 2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage, and 3) total area exceeds 8 ha (20 acres).

Lake. A natural topographic depression collecting a body of water covering at least 8 ha (20 acres) with surface water.

Lentic Wetland. See still water wetland.

Long Duration (Flooding). A duration class in which inundation for a single event ranges from 7 days to 1 month.

Lotic Wetland. See riparian wetland.

Major Type. Refers to a habitat type or community type that occupies an extensive area within a wetland zone.

Marsh. A frequently or continually inundated wetland on often developing in shallow ponds, depressions, and river margins. Marshes are dominated by herbaceous plants, such as grasses (e.g., *Phragmites*), sedges, cattails (e.g., *Typha*), and bulrushes (e.g., *Scirpus*). Waters are usually neutral to basic.

Mineral Soil. Soils composed of predominantly mineral materials (sands, silts, and clays) instead of organic materials. The soil contains less than 20 percent organic matter.

Minor Type. Refers to a habitat type or community type that seldom occupies large areas but may be common within a wetland zone.

Mollic Epipedon. A surface layer that consists of mineral soil materials and have the following properties: 1) soil structure that is not both massive and hard or very hard when dry, 2) Munsell color value less than 3 moist and 5 dry, and chroma less than 3, 3) base saturation of at least 50 percent, 4) at least 1 percent organic matter throughout the horizon, 5) typically moist for at least 3 months in most years, and 6) at least 18 cm (7 in) thick.

Mollisols. A soil order including soils with a thick dark brown to black surface horizon (mollic epipedon), has a high base saturation, and a well-developed structure. Typically associated with grassland soils.

Monotypic Stands. Stands composed primarily of a single species.

Montane. That region between the subalpine zone and the grassland zone or more broadly, mountain slopes below the alpine zone.

Mottling (obsolete). Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic reducing soil conditions. See also redox concentrations.

Natric Horizon. A special kind of argillic horizon. Natric horizons have all the properties of argillic horizons but, in addition, are 15 percent or more sodium saturated. Their formation is favored where leaching results in the accumulation of sodium on the cation-exchange complex.

Nonhydric Soils. A soil that has developed under predominantly unsaturated soil conditions.

Nonpersistent Vegetation. Plants that break down readily after the growing season; no evidence of previous year's growth at the beginning of the next grow season.

Nonwetland. Any area that has sufficiently dry conditions that hydrophytic vegetation, hydric soils, and/or wetland hydrology are lacking; it includes upland as well as former wetlands that are effectively drained.

Obligate Wetland Plant. Refers to a plant species that occurs almost always (estimated probability greater than 99 percent) under natural conditions in wetlands.

Organic Soil. Soils composed of primarily organic rather than mineral material. Equivalent to **Histosols** and includes peats and mucks.

Overbank Flooding. Any situation in which inundation occurs as a result of the water level of a river or stream rising above bank level.

Overflow Channel. An abandoned channel in a floodplain that may carry water during periods of high stream or river flows.

Oxbow Lake. A meander channel of a stream or river that is formed by breaching of a meander loop during flood stage. The ends of the cut-off meander are blocked by bank sediments.

Palustrine System (Cowardin and others 1979). Any nontidal wetland of a class dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens.

Parent Material. The unconsolidated and undeveloped mineral or organic matter from which the solum (soil) is developed.

Peraquic Moisture Regime. A soil condition in which reducing conditions always occur due to the presence of ground water at or near the soil surface.

Perennial Stream. A stream or reach of a stream that flows continuously. They are generally fed in part by springs. Surface water elevations are commonly lower than water table elevations in adjacent soils.

Permanently Flooded. A water regime condition where standing water covers the land surface throughout the year (but may be absent during extreme droughts).

Permeability. The quality of the soil that enables water to move downward through the profile, measured as the number of cm (in) per hour that water moves downward through the saturated soil.

Phase. A subdivision of a habitat type or representing a characteristic variation in climax vegetation and environmental conditions.

Pioneer Species. Species that colonize bare areas (e.g., gravel bars) where there is little or no competition from other species.

Plant Association. Used to group together all those stands of climax vegetation which occur in environments so similar that there is much floristic similarity throughout all layers of the vegetation.

Playa. A periodically flooded wetland basin. Playas are common in parts of southwest Montana.

Pond. Bodies of water encircled by wetland vegetation. Wave action is minimal, allowing emergent vegetation to establish.

Ponded. A condition in which free water covers the soil surface, for example, in a closed depression. The water is removed only by percolation, evaporated, or transpiration.

Pooled Channel Stream. An intermittent stream with significant surface pool area and without flowing surface water. The water sources for the pools are springs within the channel.

Poorly Drained. Water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods (greater than 7 days).

Pothole. A depressional wetland community caused by glaciation and is common to portions of the Northern Great Plains. The body of water is less than 8 ha (20 acres) in size.

Primary Succession. Occurs on a bare surface not previously occupied by plants, such as a recently deposited alluvial bar.

Range Of Canopy Cover. Refers to the "range" (e.g., low and high values) of canopy cover of a particular species for all the stands sampled for a habitat type or community type.

Redox Concentrations. A redoximorphic feature characterized by zones in the soil of apparent accumulation of iron and manganese oxides. These may form as nodules, concretions, soft bodies, or pore linings and vary in shape, size, and color.

Redox Depletions. A redoximorphic feature characterized by zones in the soil of low chroma (less than 3) where iron and manganese oxides alone have been removed, or where both iron/manganese oxides and clay have been removed.

Redoximorphic Features. Soil features associated with wetness and are formed as a result of the reduction and oxidation of iron and manganese compounds in the soil following saturation with water (See redox concentrations and redox depletions).

Reduced Matrix. A redoximorphic feature characterized by a soil matrix having low chroma (less than 3) in situ, but increases in hue or chroma when exposed (within 30 minutes) to air.

Reservoir. An artificial (dammed) water body with at least 8 ha (20 acres) covered by surface water.

Riparian. *adj*. Of, on, or relating to the banks of a natural course of water (Latin *riparius*, from *ripa*, bank).

Riparian Areas. A form of wetland transition between permanently saturated wetlands and uplands. The areas exhibit vegetation or physical characteristics that reflect permanent surface or subsurface water influence. Typical riparian areas include such areas as lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, glacial potholes, and shores of lakes and reservoirs with stable water levels. Riparian areas do not include ephemeral (permanently above the water table and flows only during or immediately after a rainstorm or snowmelt) streams that do not exhibit the presence of vegetation dependent upon free water in the soil (USDI Bureau of Land Management Technical References TR 1737-9 and TR 1737-11: Prichard and others 1993; Prichard and others 1994).

Riparian Plant Association. A plant community representing the latest successional stage attainable on a specific, hydrologically influenced surface (equivalent potential natural community type).

Riparian Wetlands (Lotic Wetlands). Riparian wetlands are wetlands associated with running water systems found along rivers, streams, and drainageways. Such wetlands contain a defined channel and floodplain. The channel is an open conduit which periodically, or continuously, carries flowing water, dissolved and suspended material. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the riparian wetland.

Riparian or Wetland Ecosystem. The ecosystem located between aquatic and terrestrial environments. Identified by hydric soil characteristics and riparian or wetland plant species that requires or tolerates free water conditions of varying duration.

Riparian or Wetland Species. Plant species occurring within the riparian or wetland zone. Obligate riparian or wetland species require the environmental conditions associated with the riparian or wetland zone. Facultative riparian or wetland species are tolerant of these environmental conditions, but also occur in uplands.

Riparian Zone. A geographically delineated portion of the riparian ecosystem based on management concerns.

River. Rivers are usually larger than streams. They flow year around, in years of normal precipitation, and when significant amounts of water are not being diverted out of them.

Riverbank. That portion of the channel bank cross-section that controls the lateral movement of water.

Riverine System (Cowardin and others 1979). Any wetland or deepwater habitat contained within a channel, with exception of wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens.

Salic Horizon. A mineral soil horizon 15 cm (6 in) or more thick enriched with secondary soluble salts.

Saline. Soil or water containing sufficient soluble salts to interfere with the growth of most plants.

Saturated. A soil condition in which all voids (pore spaces) between soil particles are filled with water.

Secondary Succession. The process of changing biotic communities that occurs following disturbances to a site that has previously been occupied by living organisms.

Seep. Groundwater discharge areas. In general, seeps have less flow than a spring.

Seral. Refers to vegetation that has not theoretically attained a steady state with its environment, and current populations of some species are being replaced by other species; a community or species that is replaced by another community or species as succession progresses.

Series. Refers to a group of habitat types having the same climax species.

Scrub-Shrub Wetland (Cowardin and others 1979). A *class* of wetland habitat which includes areas dominated by woody vegetation less than 6 m (20 ft) tall. It may include true shrubs, young trees, or trees or shrubs that are small or stunted because of environmental conditions.

Shrub. A multi-stemmed woody plant generally shorter than 4.8 m (16 ft).

Small Mountain Lake. A natural topographic depression collecting a body of water covering less than 8 ha (20 acres) with surface water.

Soil Series. A subdivision of a soil family and consists of soils that are similar in all major soil profile characteristics and arrangements.

Solum. The upper and most weathered part of the soil profile; the A and B horizons.

Somewhat Poorly Drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season.

Spring. Groundwater discharge areas. In general, springs are considered to have more flow than seeps.

Stable Community. The condition of little or no perceived change in plant communities that are in relative equilibrium with existing environmental conditions. It describes persistent but not necessarily climax stages in plant succession.

Stand. A plant community that is relatively uniform in composition, structure, and habitat conditions; a sample unit.

Stream. A natural waterway that is defined as first to third order.

Streambank. That portion of the channel bank cross-section that controls the lateral movement of water.

Stream Order. A classification of streams according to the number of tributaries. Order 1 streams have no tributaries; a stream of order 2 or higher has 2 or more tributaries of the next lower order.

Still Water Wetlands (Lentic Wetlands). These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (e.g., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel.

Stockpond. An artificial (dammed) body of water of less than 8 ha (20 acres) covered by surface water.

Subterranean Stream. A stream that flows underground for part of the stream reach.

Succession. The change or sequence of plant, animal, and microbial communities that successively occupy an area over a period of time. ***Primary succession*** begins on a bare surface not previously occupied by living organisms, such as a recently deposited gravel bar. ***Secondary succession*** occurs following disturbances on sites that previously supported living organisms.

Swale. A depression or topographical low area.

Sward. An expanse of grass or grass-like plants.

Tree. A single-stemmed woody plant generally taller than 4.8 m (16 ft).

Unconsolidated Bottom (Cowardin and others 1979). A *class* of wetland or deepwater habitat with at least 25 percent cover of particles smaller than stones, and a vegetative cover less than 30 percent.

Unconsolidated Shore (Cowardin and others 1979). A *class* of wetland habitat having three characteristics: 1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders, or bedrock, 2) less than 30 percent areal cover of vegetation other than pioneering plants, and 3) any of the following water regimes: irregularly exposed, regularly flooded, seasonally flooded, irregularly flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded.

Uplands. Any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring in floodplains are more appropriately termed nonwetlands.

Very Long Duration (Flooding). A duration class in which inundation for a single event is greater than 1 month.

Very Poorly Drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season.

Water Mark. A line on vegetation or other upright structures that represents the maximum height reached during a flood, ponding, or inundation event.

Water Regime (Nontidal) (Cowardin and others 1979). Includes the following types: 1) ***Permanently flooded*** — water covers the land surface throughout the year in all years. Vegetation is composed of obligate hydrophytes. 2) ***Intermittently exposed*** — surface water is present throughout the year except in years of extreme drought. 3) ***Semipermanently flooded*** — surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface. 4) ***Seasonally flooded*** — surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the soil surface. 5) ***Saturated*** — the substrate is saturated to the surface for extended periods during the growing season, but surface water is seldom present. 6) ***Temporarily flooded*** — surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season. Plants that grow both in uplands and wetlands are characteristic of the temporarily flooded regime. 7) ***Intermittently flooded*** — the substrate is usually exposed, but surface water is present for variable periods without detectable seasonal periodicity. Weeks, months, or even years may intervene between periods of inundation. The dominant plant communities under this regime may change as soil moisture conditions change. Some areas exhibiting this regime may not fall within the wetland definition because they do not have hydric soils or support hydrophytic plants.

Water Table. The upper surface of the zone of saturation within the soil or geologic material.

Wet Meadow. A herbaceous wetland on mineral soil. Generally, wet meadows occur in seasonally flooded basins and flats. Soils are usually dry for part of the growing season.

Wetlands. Areas that under normal circumstances have hydrophytic vegetation, hydric soils, and wetland hydrology. It includes landscape units such as bogs, fens, carrs, marshes, and lowlands covered with shallow, and sometimes ephemeral or intermittent waters. Wetlands are also potholes, sloughs, wet meadows, riparian zones, overflow areas, and shallow lakes and ponds having submerged and emergent vegetation. Permanent waters of streams and water deeper than 3 m (approximately 10 ft) in lakes and reservoirs are not considered wetlands (Cowardin and others 1979).

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Wetlands. Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Typical wetlands include marshes, shallow swamps, sloughs, lake shores, bogs, wet meadows, and riparian areas (USDI Bureau of Land Management Technical References TR 1737-9 and TR 1737-11: Prichard and others 1993; Prichard and others 1994).

Wetland Hydrology. Permanent or periodic inundation or prolonged soil saturation sufficient to create anaerobic conditions in the soil. Primary wetland hydrology indicators are: inundated, saturated in upper 4.7 cm (12 in), water marks, drift lines, sediment deposits, drainage patterns in wetlands. Secondary wetland hydrology indicators are: oxidized root channels in upper 4.7 cm (12 in), water-stained leaves, local soil survey data, FAC-neutral test (Environmental Laboratory, 1987).

Wetland Status. Refers to plant species that have exhibited an ability to develop to maturity and reproduce in an environment where all or portions of the soil within the root zone become, periodically or continuously, saturated or inundated during the growing season. The ability to grow and reproduce in wetlands is due to morphological and/or physiological adaptations and/or reproductive strategies of the plant (Reed 1988a; 1988b). Categories are as follows:

OBL (Obligate Wetland). Refers to species that almost always occur (estimated probability greater than 99 percent) under natural conditions in wetlands.

FACW (Facultative Wetland). Refers to species that usually occur in wetlands (estimated probability 67-99 percent), but is occasionally found in nonwetlands.

FAC (Facultative). Refers to species that are equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent).

FACU (Facultative Upland). Refers to species that usually occur in nonwetlands (estimated probability 67-99 percent), but are occasionally found in wetlands (estimated probability 1-33 percent).

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